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ELECTRONIC COMPONENTS AT 10,000 PSI

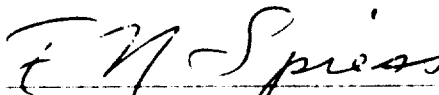
VICTOR C. ANDERSON, DANIEL K. GIBSON and ROY E. RAMEY

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ELECTRONIC COMPONENTS AT 10,000 PSI

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Marine Physical Laboratory of the
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San Diego, California 92152

ABSTRACT

This report presents the results of a component test program in which a series of commercial electronic components were immersed in oil and subjected to hydrostatic pressures ranging from 0 to 10,000 psig. Over 3000 components representing 163 manufacturer types were tested. Results are presented in graphic form for the readers' own interpretation.

INTRODUCTION

Electronic equipment used in deep submergence oceanographic work has generally been protected from pressure damage by enclosing susceptible components and assemblies in a heavy pressure case designed to withstand the extreme pressures.

The inconvenience and high cost of large, high pressure cases has generated interest in investigating other means of protecting underwater electronic equipment from the deep-ocean environment. Some types of electronic components are capable of operating at the deep-ocean ambient pressures. For equipment constructed with these components, the package design is reduced to one of surrounding the electrical equipment with a lightweight housing filled with an insulating fluid maintained at ambient sea pressure through a pressure equalizing diaphragm. The only requirements imposed on the fluid are that it possess good electrical insulating properties and produce no harmful effects on the components. Sealing problems associated with mechanical and electrical penetrations through the package wall into the sea, or from the sea, are virtually eliminated since little or no pressure differential exists across the barrier.

The performance of a limited number of components under high pressure was reported by Buchanan and Flato in 1961. Since that time a number of articles and reports have appeared on the topic. The bibliography lists several which may be of interest to the reader.

As part of a program involving extensive use of ambient pressure electronics, a comprehensive testing program was undertaken at the Marine Physical Laboratory in the summer of 1964. Letters were sent to leading component manufacturers inviting submission of samples for testing in the program.

More than half of those manufacturers invited responded by submitting over 3000 parts for testing. The tests of those components and their results are the subject of this report. The test data are presented in the form of graphs with accompanying descriptions and photographs of physical damage for the individual reader's interpretation. All data have been presented without any attempt on the part of the laboratory to give opinions or form conclusions.

BIBLIOGRAPHY

Articles

Buchanan, C. L. and M. Flato
Putting Pressure on Electronic Components
ISA Journal, Nov. 1961.

Rosenblatt, A.
New Circuits Withstand Deep-Sea Pressures
Electronic Design, Feb. 1, 1965.

Gibson, D. K.
High Pressure Tests of Silicon Transistors
and Miscellaneous Components
J. Geophys. Res., 68, No. 18, Sept. 15, 1963.

Reports

Report of NRL Progress
Nov. 1960, pp 41-42
Dec. 1960, pp 50-52
Mar. 1961, pp 47-48
May 1961, pp 38-41
June 1961, pp 9-18, pp 50-52
Sept. 1961, pp 55-57
Oct. 1961, pp 48-50
Feb. 1962, pp 31-33
Apr. 1962, pp 52-54

Wilner, L. B.
*Studies of the Performance of Electronic
Components under Deep Ocean Pressures*
Lockheed Missile and Space Division, Re-
port #LMSD-894807, ASTIA Ref. AD-254-606,
Feb. 1961.

Nielsen, E. G.
High Pressure Circuit and Component Study
General Electric Company, Report TIS-
R62ELS-19, Feb. 1962.

Martin-Marietta Corporation
*Operation of Electronic Components under
Severe Hydrostatic Pressures*
Report #1, ER 12423, April 1962.

Jackson, J. M. and G. R. Koonce
*Preliminary Report on the Effects of Pressure
on Electronic Components*
General Electric Company, May 1, 1962.

Martin-Marietta Corporation
*Operation of Electronic Components under
Severe Hydrostatic Pressures*
Progress Report #2, ER 12533, Aug. 1962.

TEST PROGRAM

Test Procedure

The test samples when received were catalogued and visually inspected for damage prior to being tested.

Sets of twenty components were used in each test wherever possible to obtain an adequate statistical sampling which would offer a more reasonable probability of failure or extreme deviation than a single component.

A maximum of seventy six components were installed in a pressure chamber containing a laboratory grade of light mineral oil. The chamber was sealed off and an initial set of readings taken at zero psig. The pressure was increased in 1000 psig increments to 10,000 psig and then varied between 0 and 10,000 psig for

a total of five cycles. A soak period at a prescribed pressure was conducted as time and conditions allowed. Pressure was then reduced to zero psig.

Electrical measurements of the components were made at the initial zero pressure conditions, at each of the 1000 psig increments, after the cycling period, at the end of the soak period and finally on return to zero pressure, making a total of fourteen readings per component. The test conditions corresponded to the respective manufacturers' specifications.

The components were then removed from the chamber, cleaned and visually inspected for physical damage.

Data Reduction

Data taken during the test, using instruments listed in "Description of Test Equipment," were recorded on prepared data sheets. This data was then transferred to punch cards for processing by a Control Data Corporation 3600 computer.

The computer was programmed to normalize each reading in a test sequence of a particular test component to that component's initial zero pressure reading. The results at each pressure station for a set of samples were averaged and the maximum and minimum values determined by the computer. Any component deviation of more than 50% from the initial zero pressure readings

was considered an incipient failure and deleted from the computations for that pressure. In some cases the apparent failures recovered at some subsequent pressure. These cases were then returned to the program at the recovery pressure.

The average, minimum and maximum values, number of components in a set, and pressures at which failures occurred are shown on individual graphs for each set of components tested. Additional descriptions and typical photographs are supplied of all visible mechanical damage. The presentation of this data is covered under "Data Format" in this report.

Description of Test Equipment

A schematic diagram of the test setup is given in Fig. 1. The hydraulic system is self explanatory. The chamber itself is a 192 cu. in. cylindrical pressure vessel. A screw-on, O-ring seal top contains six electrical bulkhead connectors and one hydraulic vent valve. Test

samples were attached to a mounting bracket on the removable chamber top. The various electrical testing configurations are shown schematically in Fig. 2. The major testing components are listed below.

Test Equipment List

Description		Manufacturer
Pressure Chamber		Marine Physical Laboratory
Pressure Gauge, 0-10,000 psig	Model No. 8338	Ashcroft
Pressure Regulator	Model No. 8804	Bastian-Blessing Co.
Air-to-Hydraulic Booster Pump	Model No. 15067WT	Scientific Engineering Corporation
System Oiler	Model No. 8844	Bastian-Blessing Co.
Stepping Relay	Model No. 20-1004	C. P. Clare
Isolation Trans.	Model No. 1F921	Chicago-Stancor
Constant Voltage Trans.	Model No. 20808	Sola Corporation
Volt-Ohmmeter	Model No. 412A	Hewlett Packard
AC Voltmeter	Model No. 400D	Hewlett Packard
Impedance Bridge	Model No. 250DA	Electro Scientific Corporation
Wide Range Oscillator	Model No. 200CD	Hewlett Packard
Oscilloscope	Model No. 535	Tektronix, Inc.
Transistor Curve Tracer	Model No. 575	Tektronix, Inc.
Binocular Microscope	Model No. SVB-73	Bausch & Lomb

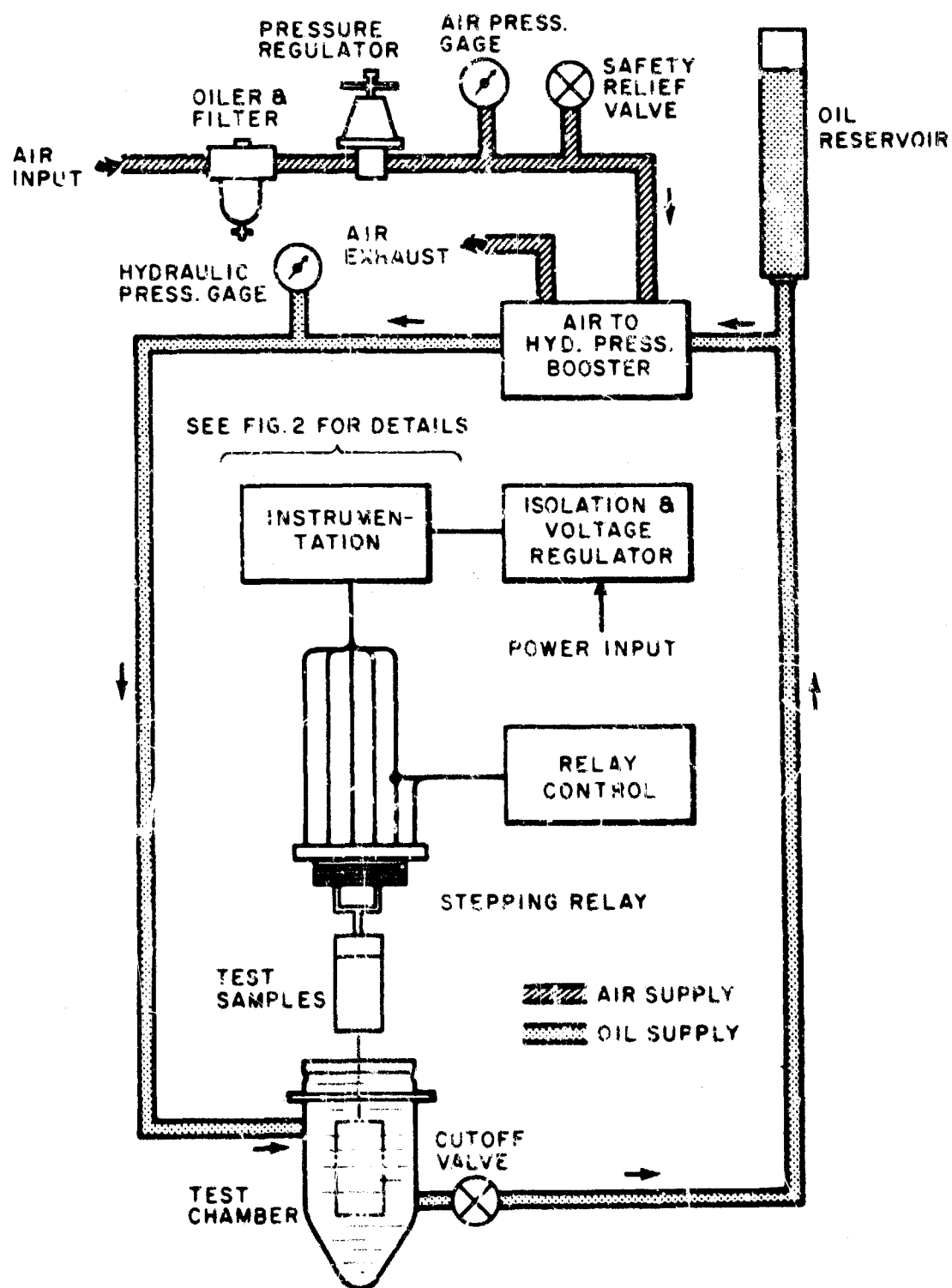


Fig. 1. Test Setup

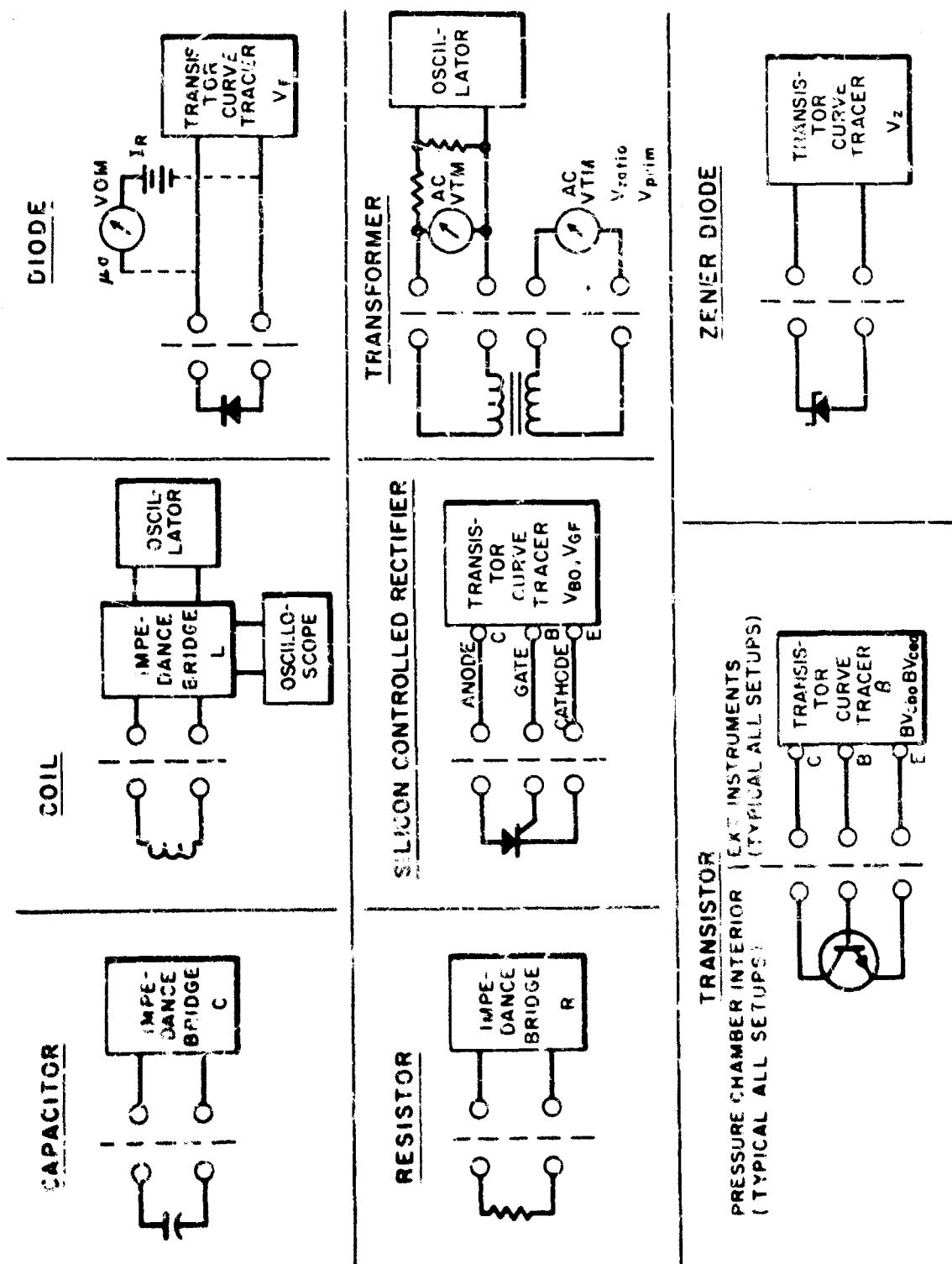


Fig. 2. Electrical Testing Configurations

TEST DATA

Index of Components by Manufacturer

			Page
Allen-Bradley Company	136 West Greenfield Avenue Milwaukee, Wisconsin	Resistors	110-131
Centralab	900 East Keefe Avenue Milwaukee, Wisconsin	Capacitors	10-17
Cornell-Dubilier Electronics	50 Paris Street Newark, New Jersey	Capacitors	18-53
Corning Glass Works	Electronic Products Division 3500 Electronics Drive Raleigh, North Carolina	Capacitors Resistors	54-61 130-137
Dale Electronics, Inc.	1370 28th Avenue Columbus, Ohio	Resistors	136-137
General Instrument Corp.	65 Gouverneur Street Newark 4, New Jersey	Diodes Resistors Transistors	78-87 138-139 170-173
Microtran Company, Inc.	145 East Mineola Avenue Valley Stream, New Jersey	Chokes Transformers	68-69 156-163
J. W. Miller Company	5917 So. Main Street Los Angeles, California	Chokes	70-77
Motorola	Semiconductor Products Div. 5105 E. McDonald Road Phoenix, Arizona	Diodes Transistors Integrated Networks	88-95 174-177 188-191
Ohmite Manufacturing Co.	5635 Howard Street Skokie, Illinois	Diodes Resistors	98-101 140-151
The Potter Company	1424 So. Allec Street Anaheim, California	Capacitors	60-61
F. W. Sickles	Division of General Instrument Corporation P. O. Box 330 Chicopee, Massachusetts	Chokes Transformers	66-67 156-157

Index of Components by Manufacturer (Cont'd)

			Page
Sylvania	Semiconductor Division 100 Sylvan Road Woburn, Massachusetts	Diodes	102-105
		Transistors	178-183
Texas Instruments	Components Division 13500 N. Central Expressway Dallas, Texas	Capacitors	62-65
		Diodes	106-111
		Resistors	152-155
		Silicon Controlled Rect.	154-155
		Transistors	184-187
United Transformer Corp.	150 Varick Street New York 13, New York	Transformers	162-169

Index of Components by Type

Type	No. of Sets	No. of Components	Page
Capacitor	56	1060	10-65
Choke	12	211	66-77
Diode	17	400	78-111
Integrated Networks	4	80	158-191
Resistor	44	860	110-155
Silicon Controlled Rectifier	1	5	154-155
Transformer	14	190	155-169
Transistor	15	380	170-187
Totals	163	3186	

Data Format

The maximum, minimum and average electrical characteristics of each component type are plotted versus pressure. The graphs are normalized to unit initial values before application of pressure.

The ordinate of the graphs uses a composite of linear and log scales so that deviations of less than $\pm 10\%$ appear on a linear scale and deviations greater than $\pm 10\%$ are shown on a log scale. The exceptions to this form are the graphs for transistors and diodes. The accuracy of the readings for these components is of the order of $\pm 10\%$; therefore, the entire ordinate uses a log scale to avoid exaggerating inherent reading errors.

As previously stated, components having a relative value change greater than 50% were

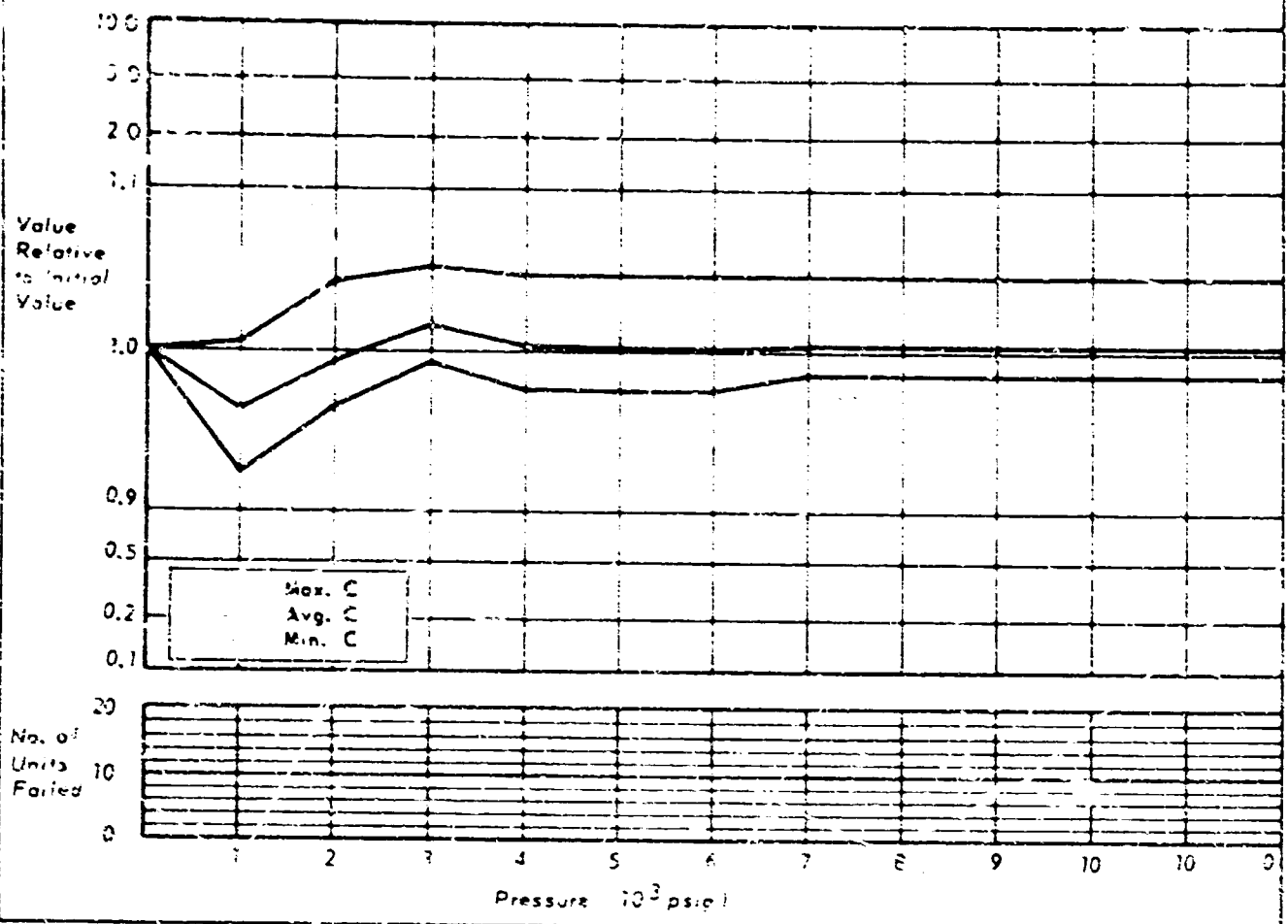
considered a failure and dropped from the set in computing values at that pressure.

The number of failures for each test set are shown in a bar graph for each 1000 psig pressure increment. This graph shows failures in the pressure interval in which they appear. The percentage of failures can be determined by reference to the total number of components tested given at the top of each graph.

Each graph is accompanied on the facing page by a complete description of the component tested, a summary of changes in relative value, a review of any physical damage and, where appropriate, a photograph of any visual physical evidence of mechanical damage.

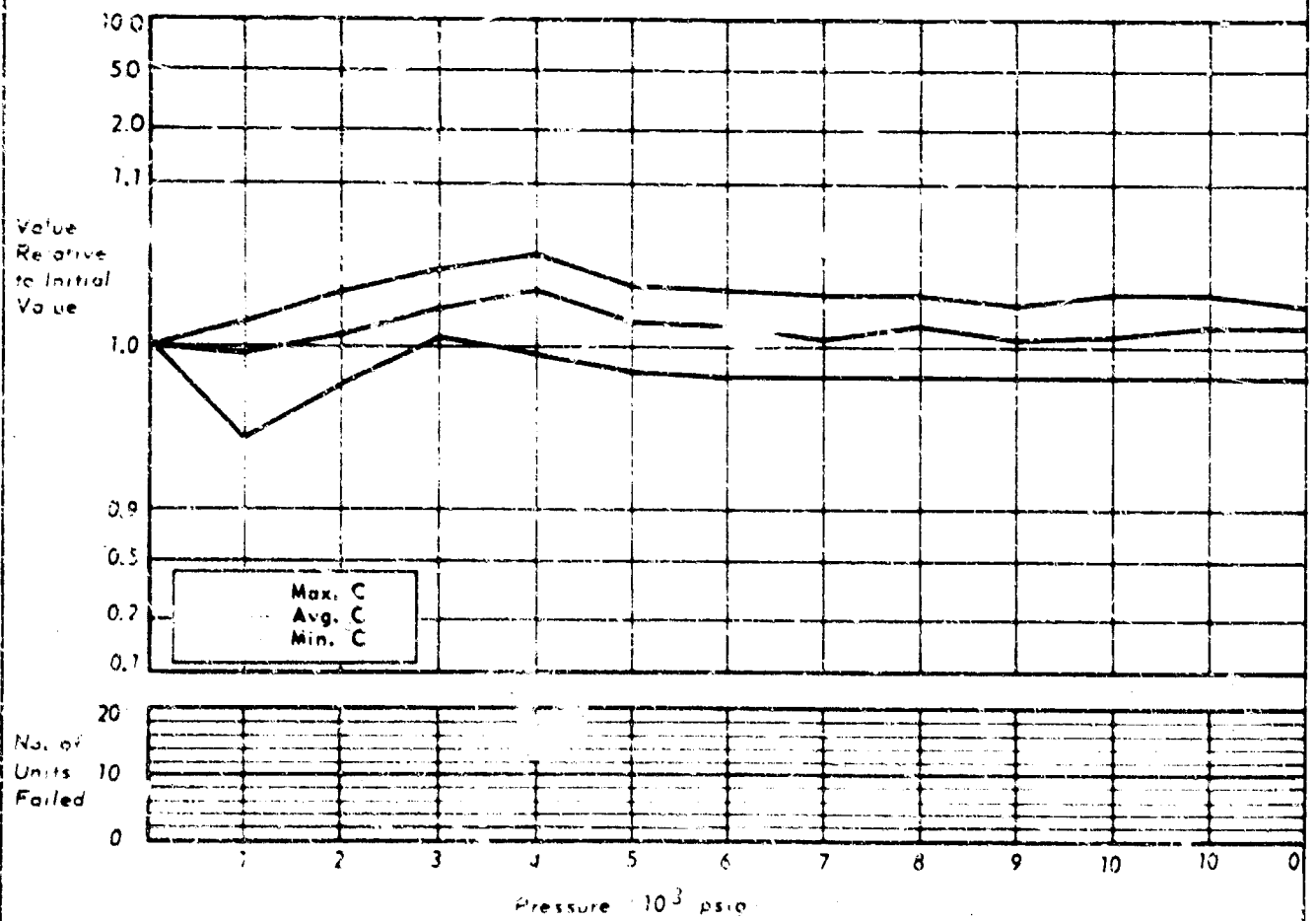
MFG. - CENTRALAB
 TYPE - CAPACITOR
 DESCRIPTION - DD-580

CHART NO. 1
 NO. OF SAMPLES TESTED - 20



MFG. - CENTRALAB
 TYPE - CAPACITOR
 DESCRIPTION - 050

CHART NO. 2
 NO. OF SAMPLES TESTED - 10



CentraJob
DD-560
Capacitor
SOAK PERIOD: 16 hours at 10,000 psig.
MECHANICAL: No apparent damage.
ELECTRICAL: All components indicated less than 10% change.

56 pF $\pm 10\%$
1000 VDCW

Ceramic, disc
Radial lead
0.12 x 0.25" diam.

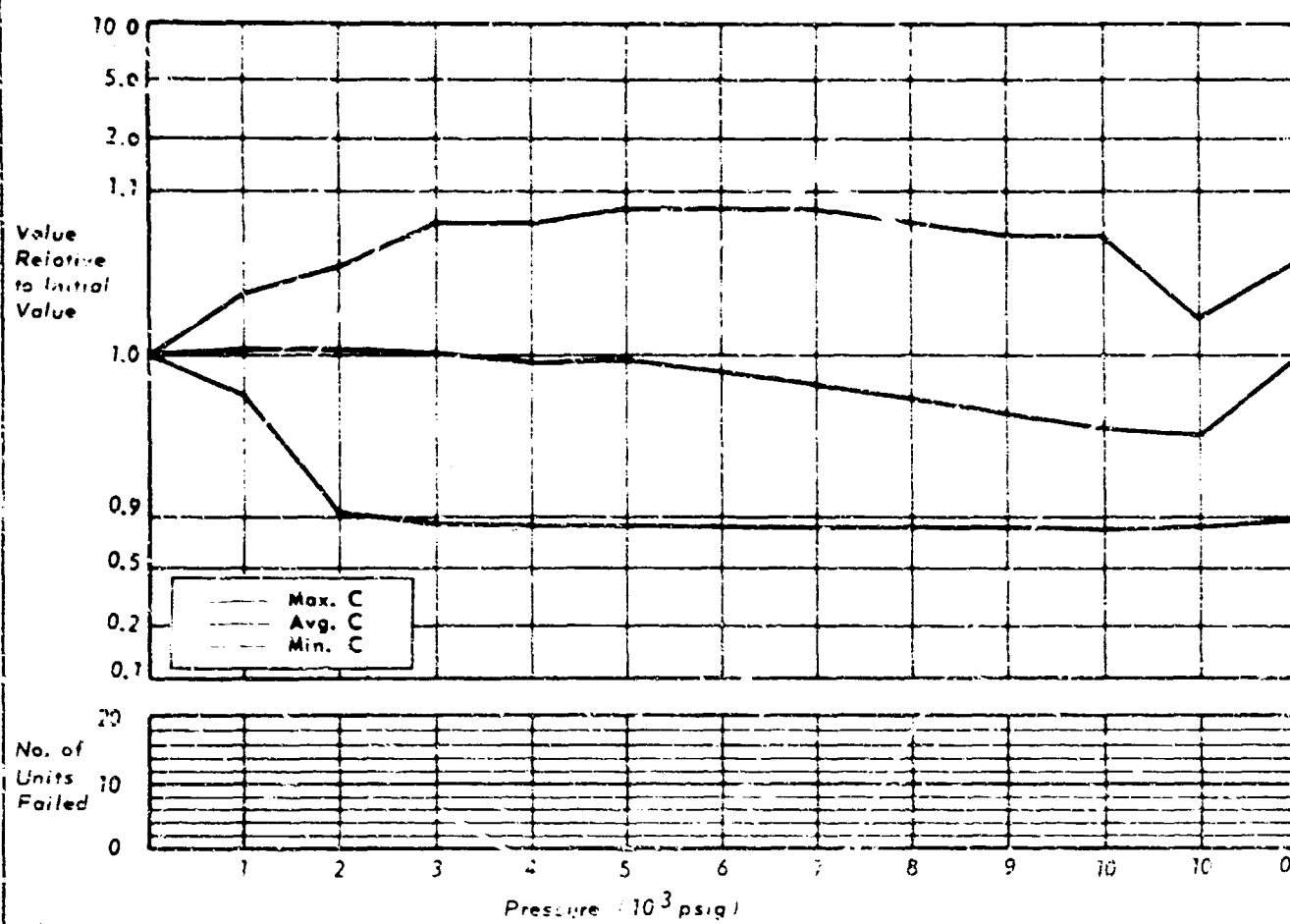
CentraJob
Type 560
Capacitor
SOAK PERIOD: 16 hours at 7,000 psig.
MECHANICAL: No apparent damage
ELECTRICAL: All components indicated less than 10% change.

100 pF $\pm 10\%$
5000 VDCW

Metal case
Axial stud
0.65 x 0.812" diam.

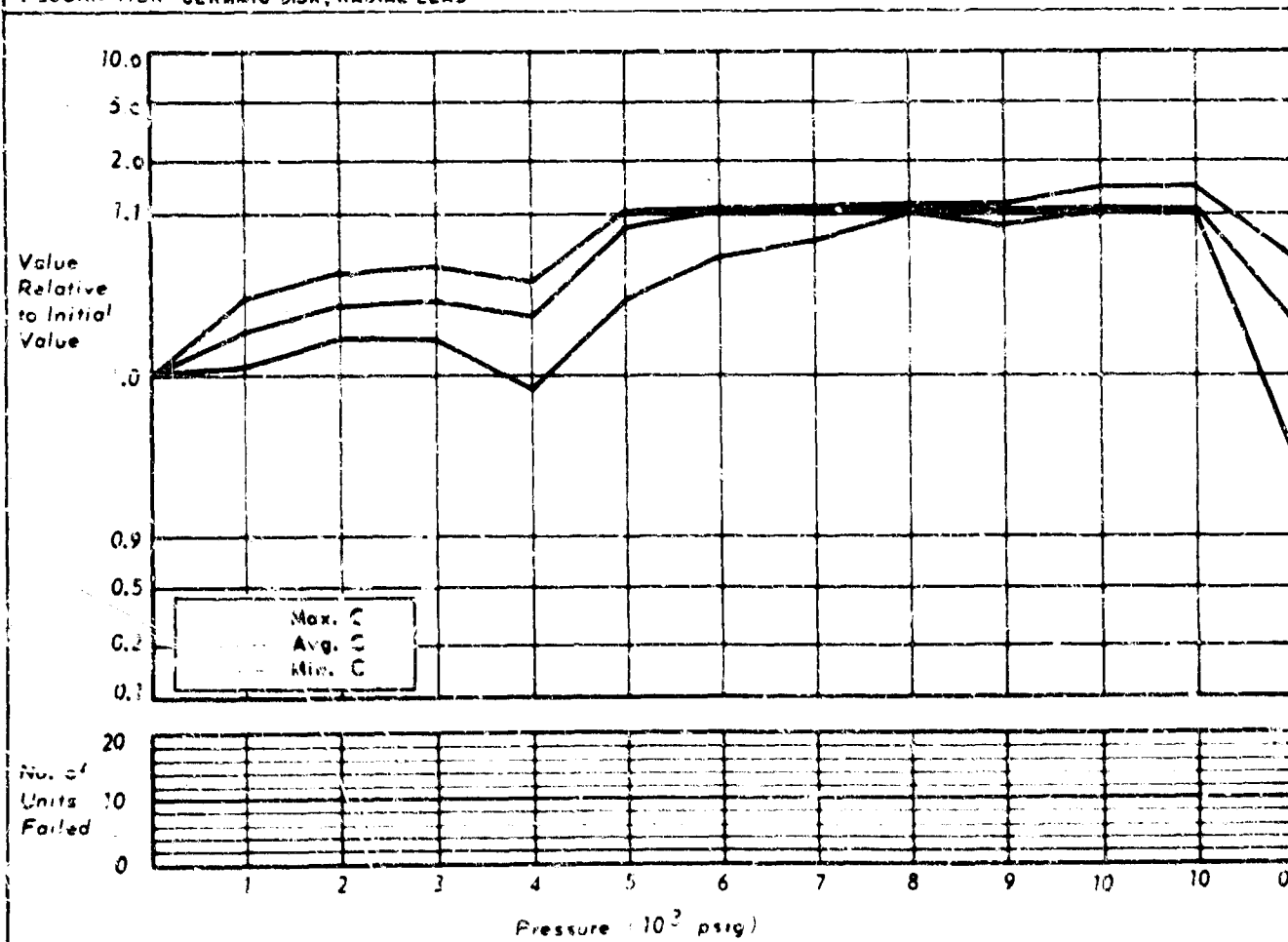
MFG. - CENTRALAB
 TYPE - CAPACITOR, 741-0814, 501M7 8MV, 500VDCW
 DESCRIPTION - CERAMIC FEED THRU, AXIAL LEAD

CHART NO. 3
 NO. OF SAMPLES TESTED - 20



MFG. - CENTRALAB
 TYPE - CAPACITOR, 3A-203, .02 μ F $\pm 100\%$, 30VDCW
 DESCRIPTION - CERAMIC DISK, RADIAL LEAD

CHART NO. 4
 NO. OF SAMPLES TESTED - 12



Centralab

741-061Y

Capacitor

SOAK PERIOD: None

MECHANICAL: No apparent damage

ELECTRICAL: Seventeen components indicated less than 10% change.

Three components indicated a change greater than 10% and less than 50%.

0.001 μ F GMV

100 VDCW

Ceramic, feed through

Tubular, axial lead

0.4 x 0.18" diam.

Centralab

DA-203

Capacitor

SOAK PERIOD: 16 hours at 3,000 psig.

MECHANICAL: No apparent damage

ELECTRICAL: All components indicated a change greater than 10% and less than 50%.

0.02 μ F $\begin{matrix} +100 \\ -20 \end{matrix}$ %

30 VDCW

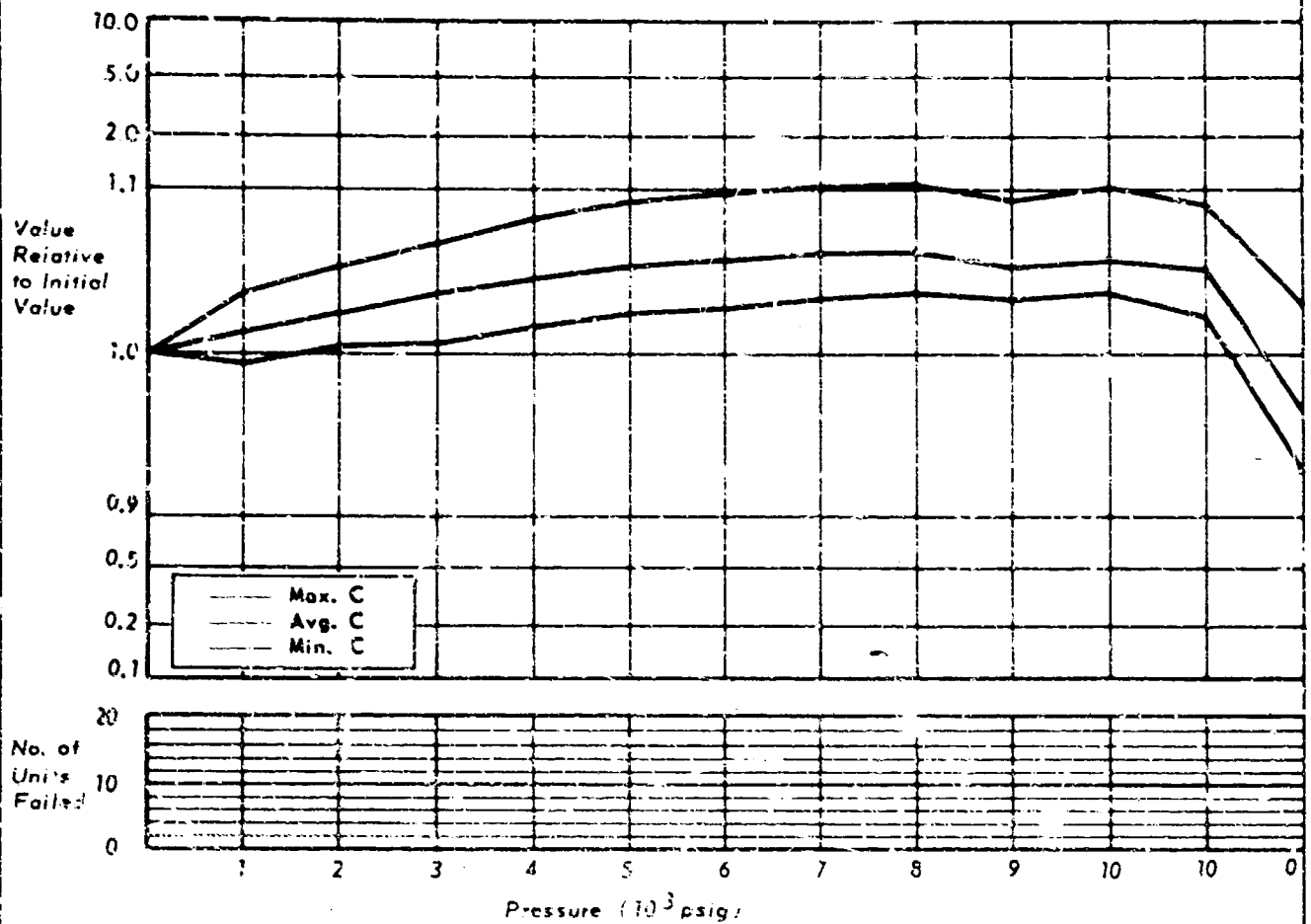
Ceramic, water

Square, radial lead

0.57 x 0.57 x 0.12" th.

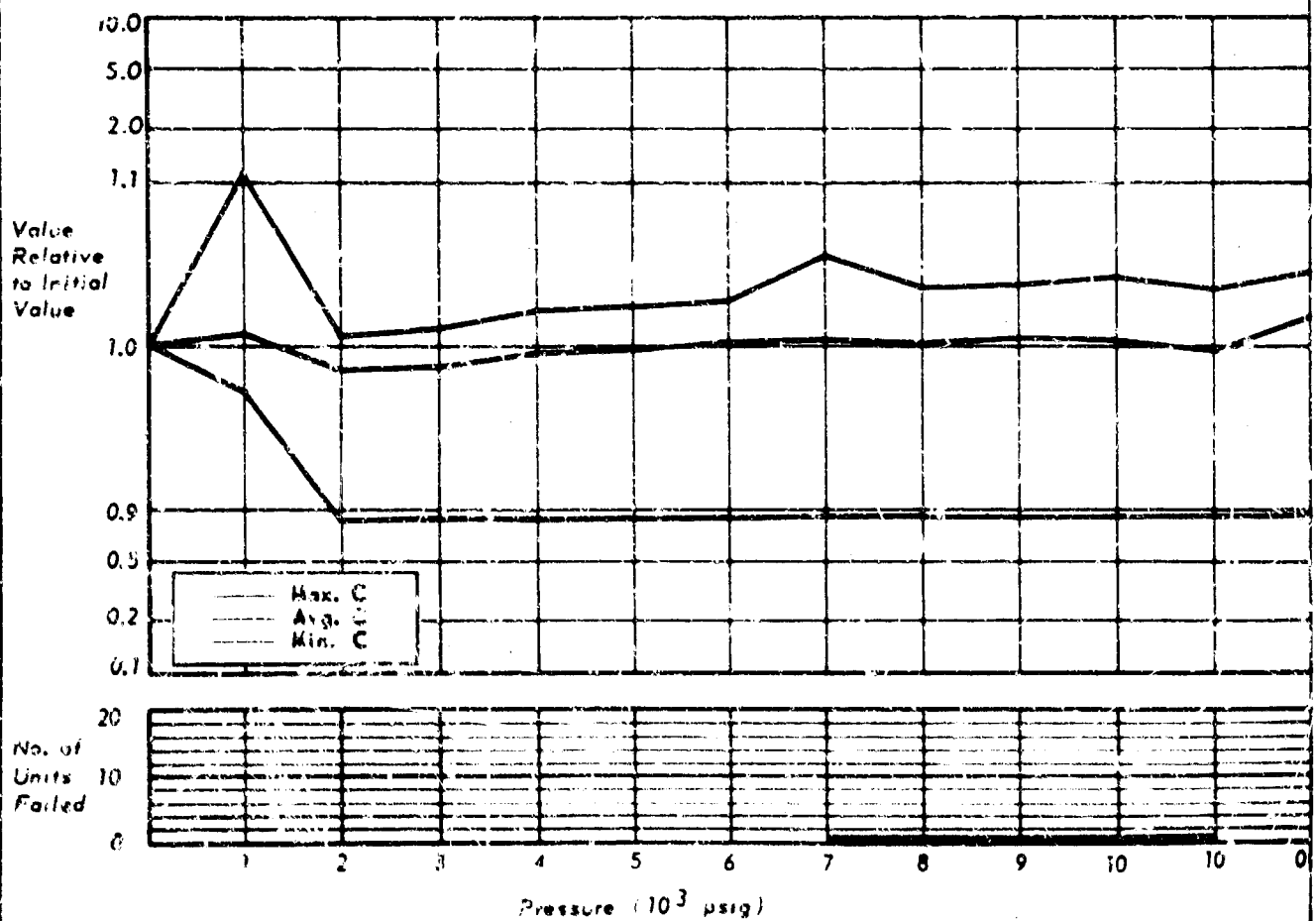
MFG. - CENTRALAB
 TYPE - CAPACITOR, DD-203, .02 μ F $\pm$ 20%, 500VDCW
 DESCRIPTION - CERAMIC DISK, RADIAL LEADS

CHART NO. 5
 NO. OF SAMPLES TESTED - 20



MFG. - CENTRALAB
 TYPE - CAPACITOR, DD-472, .0047 μ F $\pm$ 20%, 75VDCW
 DESCRIPTION - CERAMIC DISK, RADIAL LEADS

CHART NO. 6
 NO. OF SAMPLES TESTED - 20



Centralab

DD-203

Capacitor

0.02 μ F $\begin{smallmatrix} +80 \\ -20 \end{smallmatrix}$ %
600 VDCW

Ceramic, disc

Radial lead

0.13 x 0.61" diam.

SOAK PERIOD: 16 hours at 3,000 psig.

MECHANICAL: No apparent damage

ELECTRICAL: Nineteen components indicated less than 10% change.

One component indicated a change greater than 10% with subsequent recovery to less than 10% change on return to 0 psig.

Centralab

DD-472

Capacitor

0.0047 μ F ± 20 %
75 VDCW

Ceramic, disc

Radial lead

0.12 x 0.55" diam.

SOAK PERIOD: 16 hours at 3,000 psig.

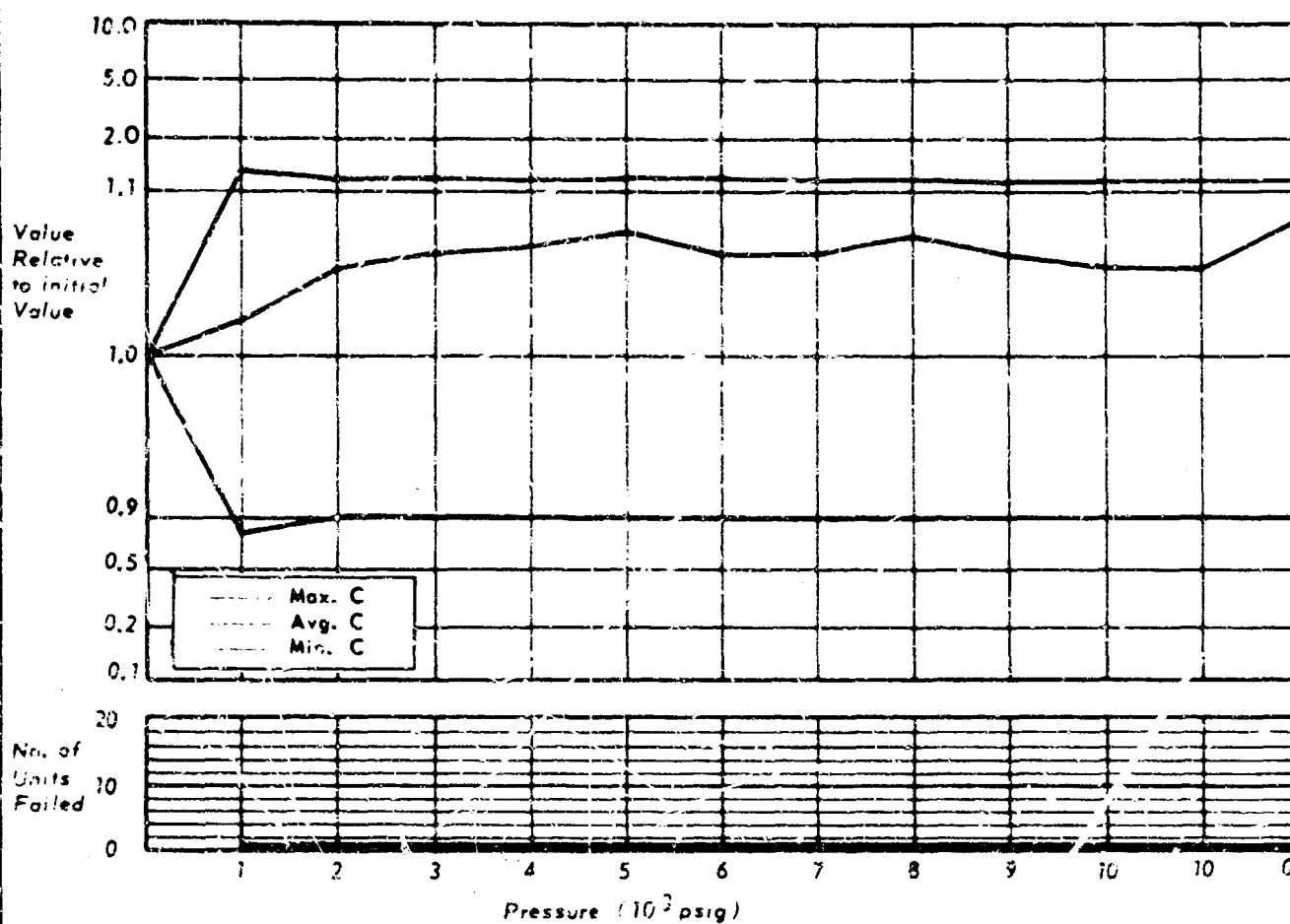
MECHANICAL: No apparent damage.

ELECTRICAL: Nineteen components indicated less than 10% change.

FAILURES: One component indicated a permanent change greater than 50% at the pressures shown on the failure graph on opposite page.

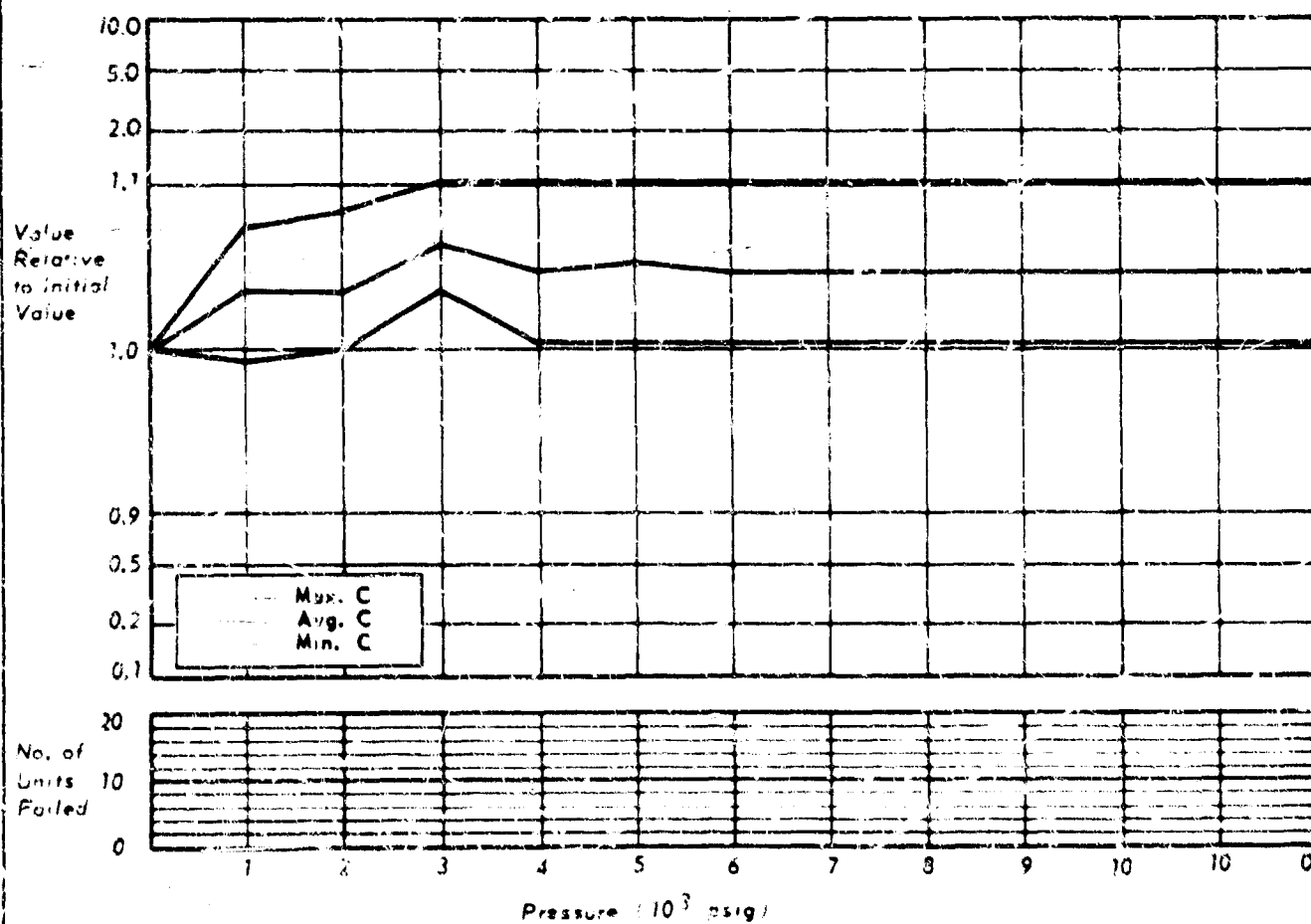
MFG. - CENTRALAB
 TYPE - CAPACITOR
 DESCRIPTION - D3A-104

CHART NO. 7
 NO. OF SAMPLES TESTED - 20



MFG. - CENTRALAB
 TYPE - CAPACITOR
 DESCRIPTION - CVII0450

CHART NO. 8
 NO. OF SAMPLES TESTED - 20



Centralab

0.1 μ F $\begin{matrix} +80 \\ -30 \end{matrix} \%$

Ceramic, disc

DDA-104

75 VDCW

Wax impreg

Capacitor

0.2 x 0.65" diam.

SOAK PERIOD: 15.5 hours at 3,000 psig.

MECHANICAL: One component was damaged as shown in accompanying photograph.

ELECTRICAL: Nineteen components indicated less than 10% change.

FAILURES: One component indicated a permanent change greater than 50% at the press ... shown on the failure graph on opposite page.



Centralab

7 to 45 pF

Ceramic, trimmer

CV11D450

600 VDCW

Chassis mount, radiating

Capacitor, variable

0.64 x 0.84" diam.

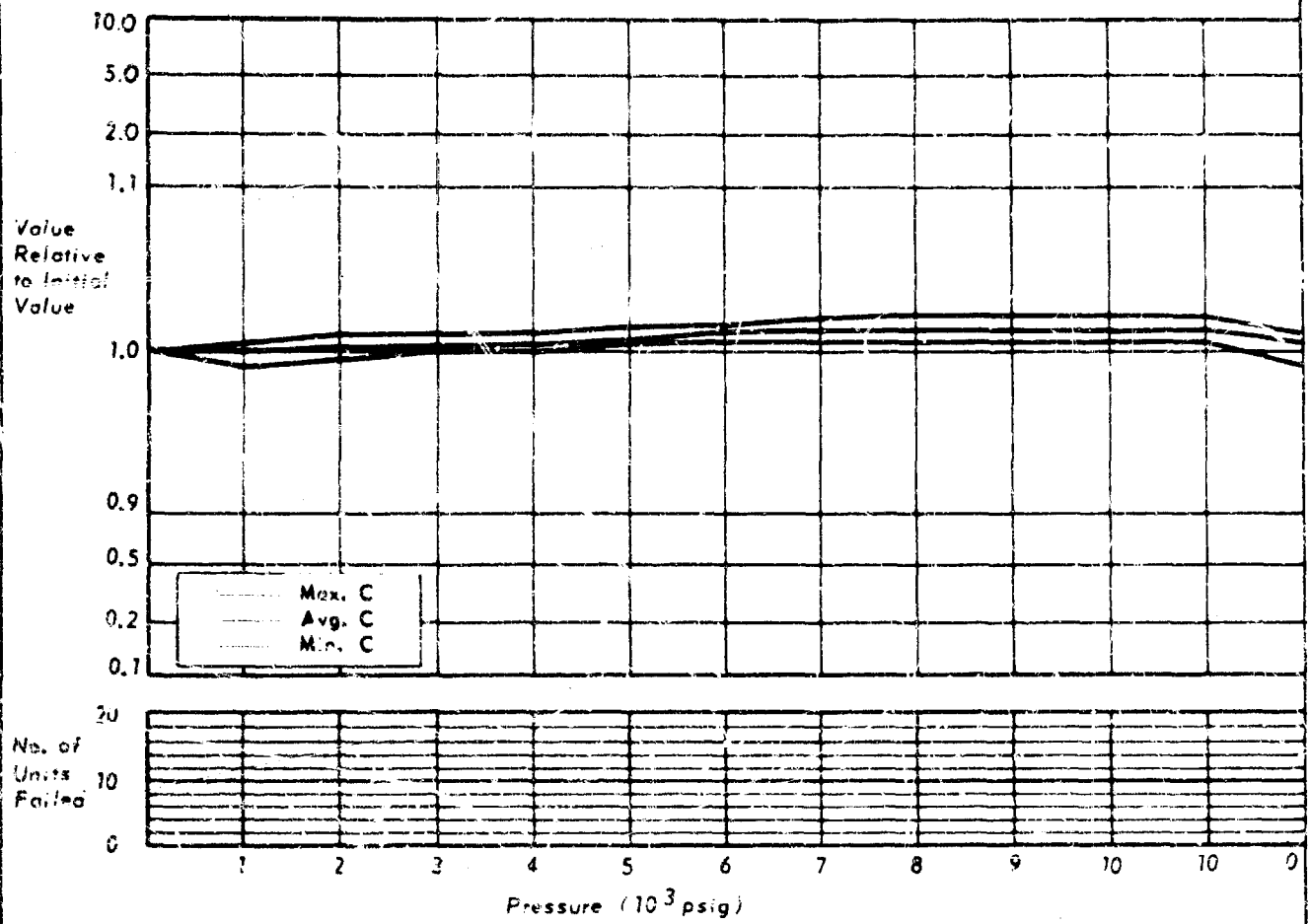
SOAK PERIOD: 16 hours at 10,000 psig

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

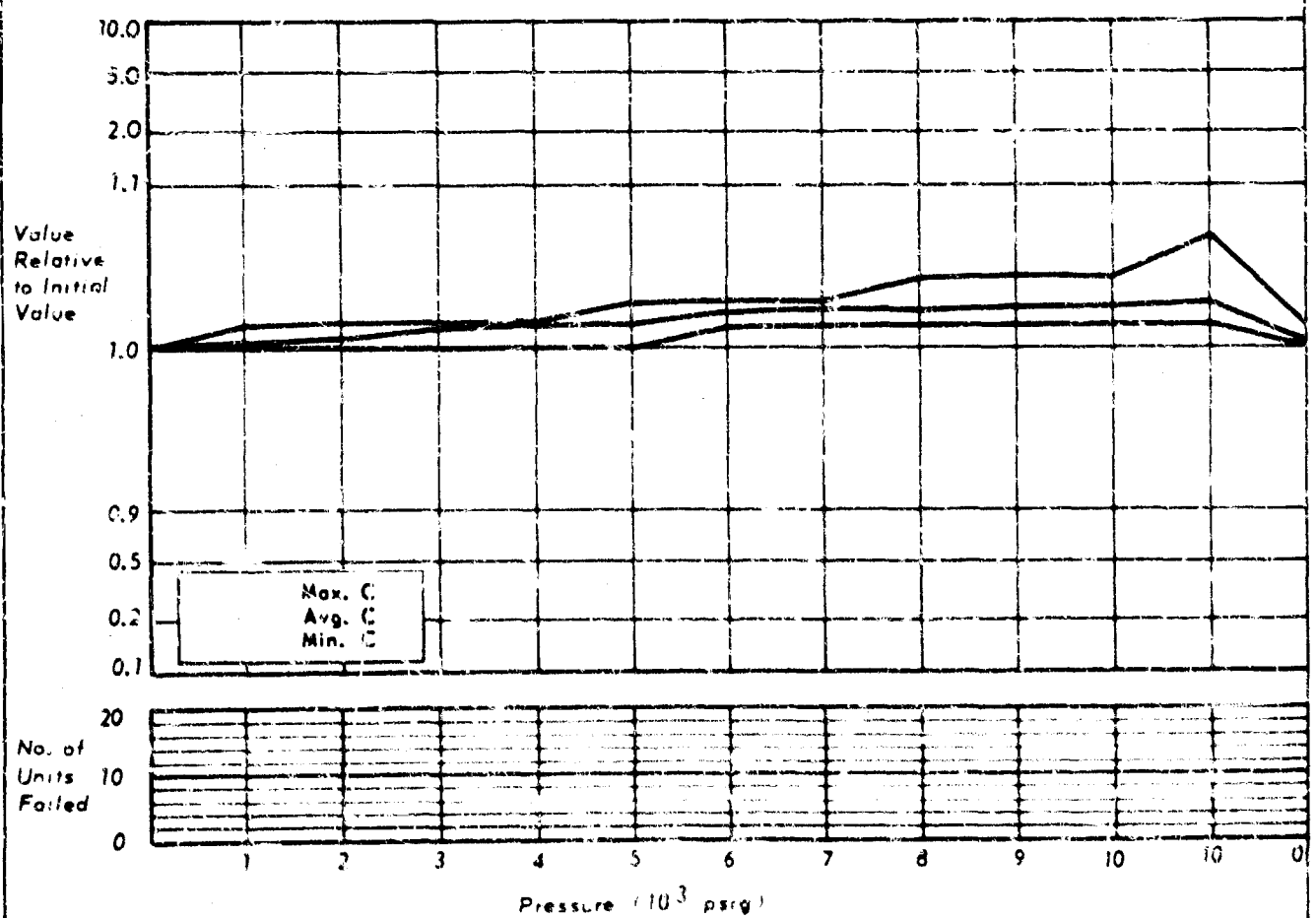
MFG. - CORNELL - DUBLIER
 TYPE - CAPACITOR, DPMS 1522, .002 μ F $\pm$ 20%, 100VDCW
 DESCRIPTION - PAPER FILM, TUBULAR, RADIAL LEADS

CHART NO. 9
 NO. OF SAMPLES TESTED - 19



MFG. - CORNELL - DUBLIER
 TYPE - CAPACITOR, DPMS 806, .006 μ F $\pm$ 20%, 600VDCW
 DESCRIPTION - PAPER FILM, TUBULAR, RADIAL LEADS

CHART NO. 10
 NO. OF SAMPLES TESTED - 19



Cornell-Dubilier
DPMS 1522
Capacitor

0.002 μ F $\pm$ 20%
100 VDCW

Paper, mylar
Tubular, radial lead
Dipped casing
0.63 x 0.37" diam.

SOAK PERIOD: 15 hours at 8,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

Cornell-Dubilier
DPMS 6D6
Capacitor

0.006 μ F $\pm$ 2%
500 VDCW

Paper, mylar
Tubular, radial lead
Dipped casing
0.69 x 0.34" diam.

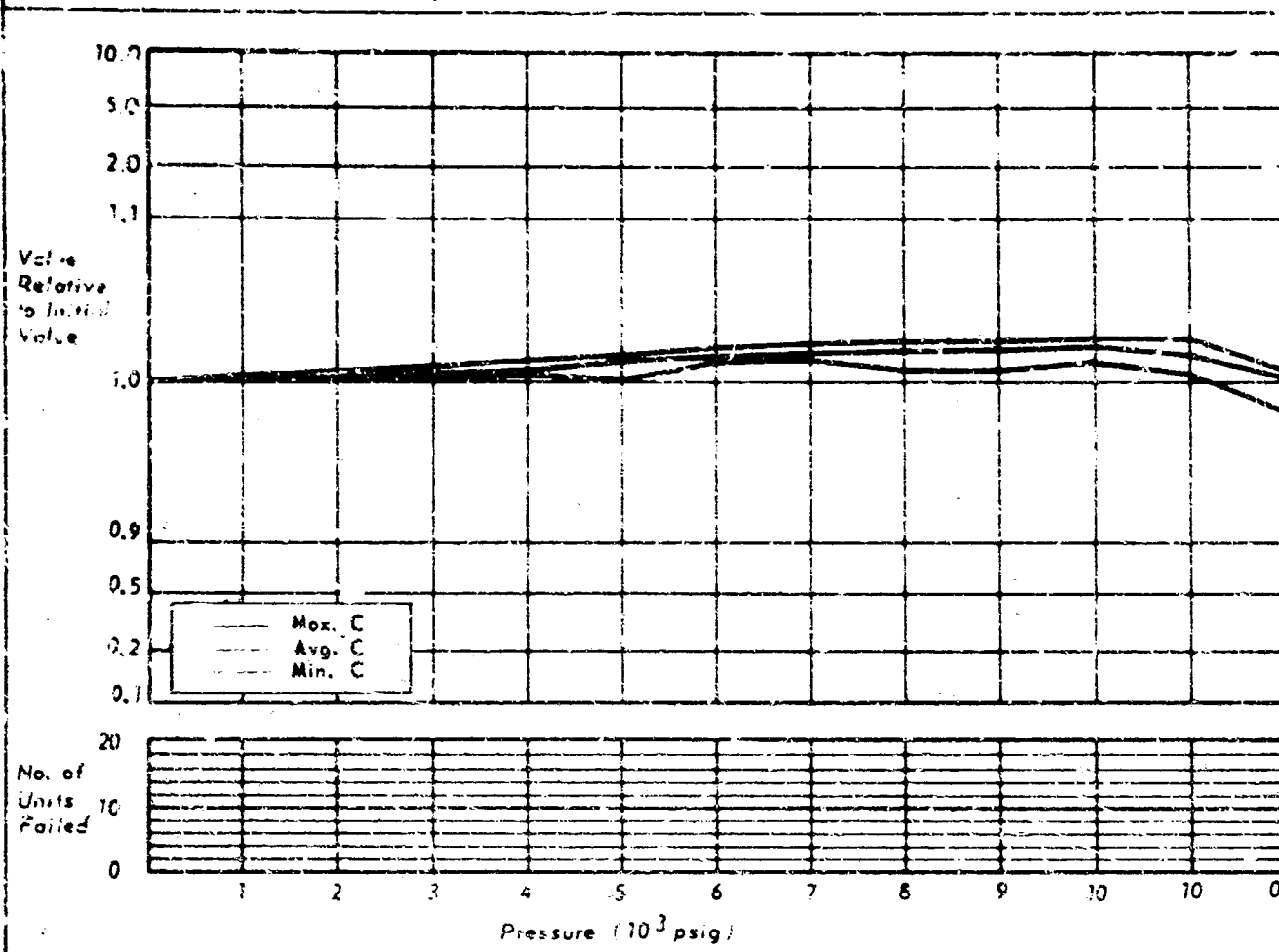
SOAK PERIOD: 16 hours at 8,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

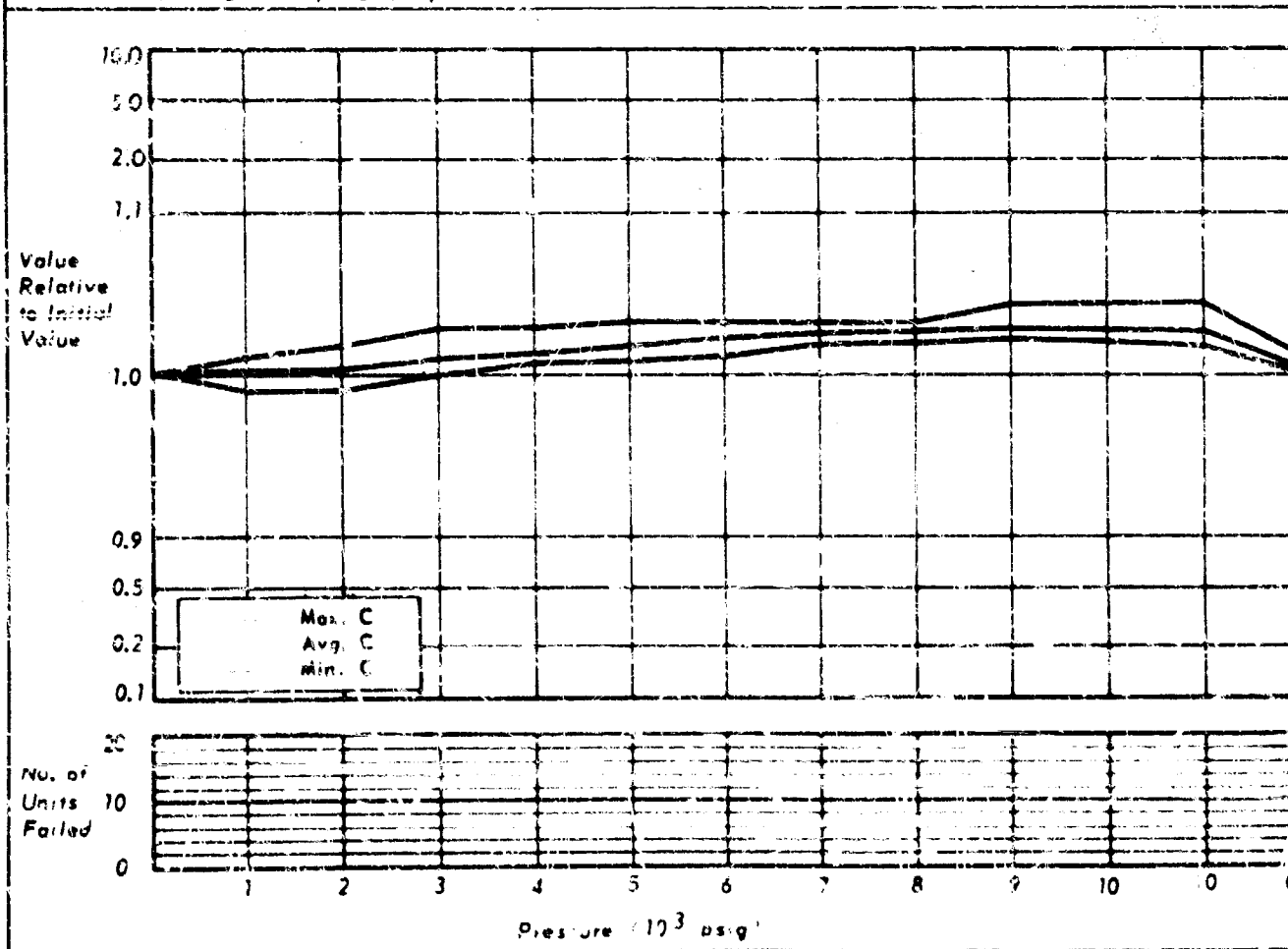
MFG. - CORNELL-DUBILIER
 TYPE - CAPACITOR, OPMS 1833, 033 μ F $\pm$ 20%, 100VDCW
 DESCRIPTION - PAPER FILM, TUBULAR, RADIAL LEADS

CHART NO. 11
 NO. OF SAMPLES TESTED - 20



MFG. - CORNELL-DUBILIER
 TYPE - CAPACITOR, OPMS 491, 1 μ F $\pm$ 20%, 400VDCW
 DESCRIPTION - PAPER FILM, TUBULAR, RADIAL LEADS

CHART NO. 12
 NO. OF SAMPLES TESTED - 20



Cornell-Dubilier

DPMS 1533

Capacitor

0.033 μ F $\pm$ 20%

100 VDCW

Paper, mylar

Tubular, radial lead

Dipped casing

0.63 x 0.37" diam.

SOAK PERIOD: 16 hours at 2,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

Cornell-Dubilier

DPMS 4P1

Capacitor

0.1 μ F $\pm$ 20%

500 VDCW

Paper, mylar

Tubular, radial lead

Dipped casing

0.52 x 1.18" diam.

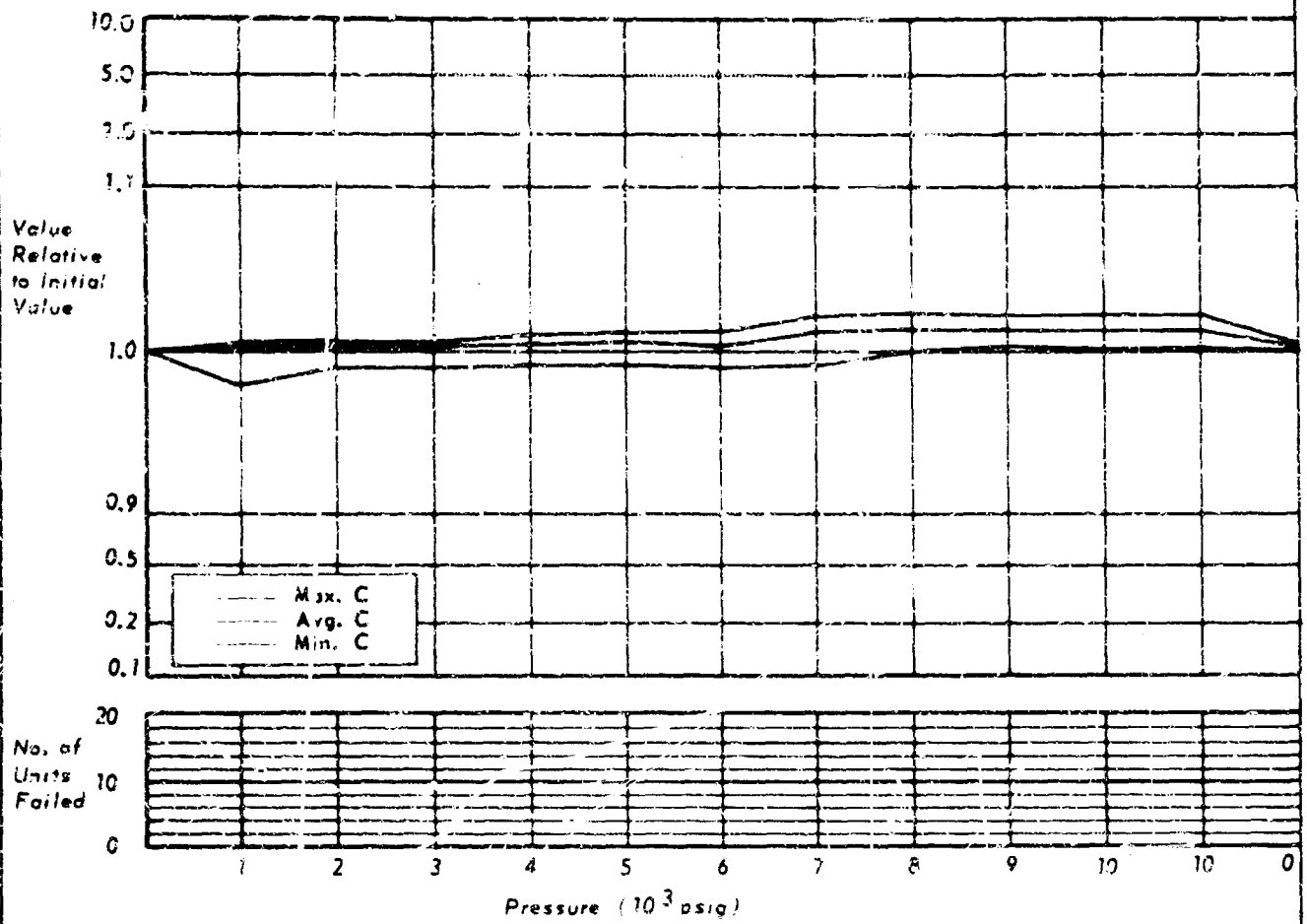
SOAK PERIOD: 16 hours at 10,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

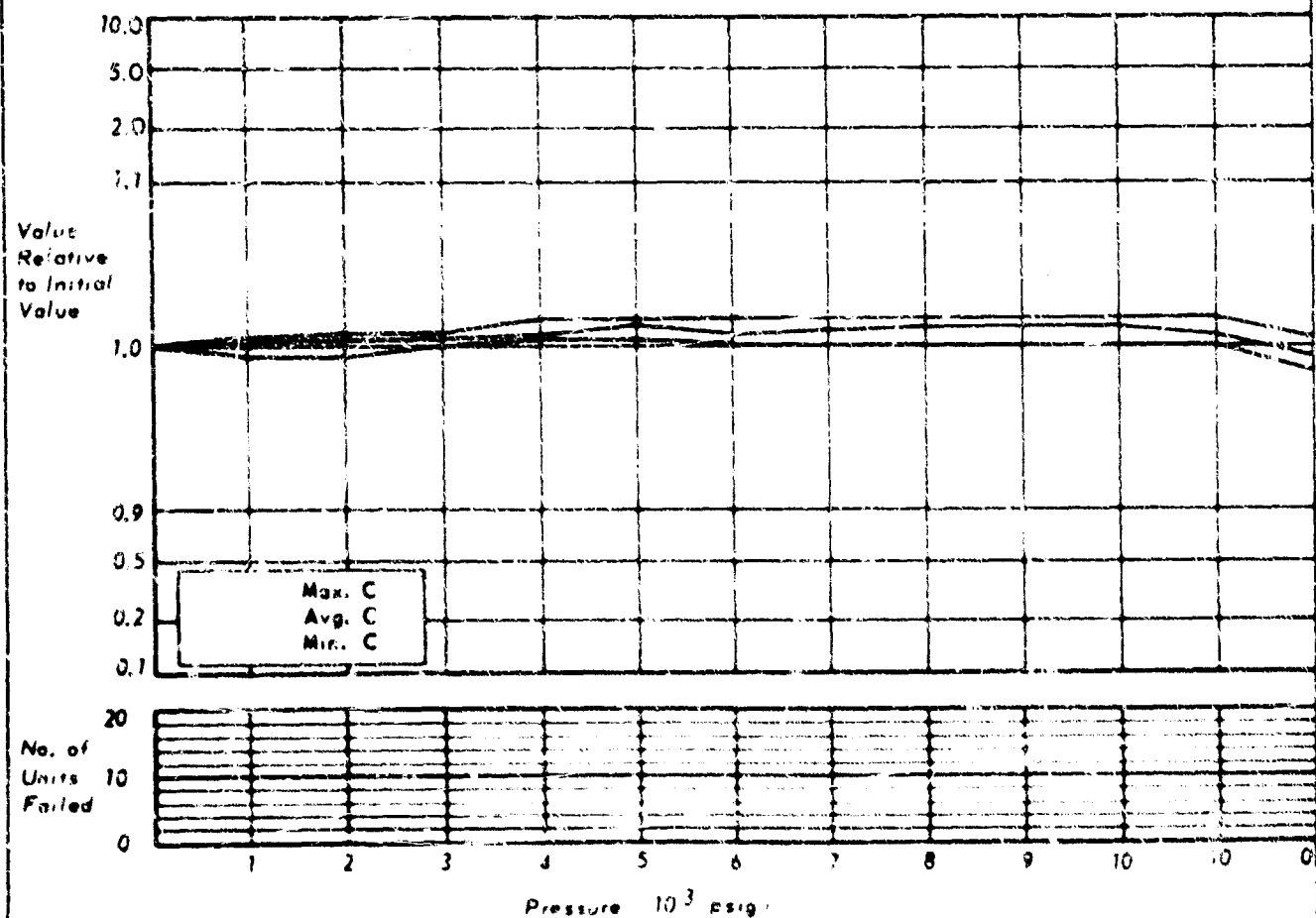
MFG. - CORNELL-DUBILIER
 TYPE - CAPACITOR
 DESCRIPTION - DPM6 2P22

CHART NO. 13
 NO. OF SAMPLES TESTED - 20



MFG. - CORNELL-DUBILIER
 TYPE - CAPACITOR
 DESCRIPTION - DPM6 4P12

CHART NO. 14
 NO. OF SAMPLES TESTED - 20



Cornell-Dubilier
DPMS 2P22
Capacitor

$0.22 \mu F \pm 20\%$
200 VDCW

Paper, mylar
Tubular, radial lead
Dipped casing
1.3 x 0.59" diam.

SOAK PERIOD: 16 hours at 10,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

Cornell-Dubilier
DPMS 4P22
Capacitor

$0.22 \mu F \pm 20\%$
400 VDCW

Paper, mylar
Tubular, radial lead
Dipped casing
1.56 x 0.62" diam.

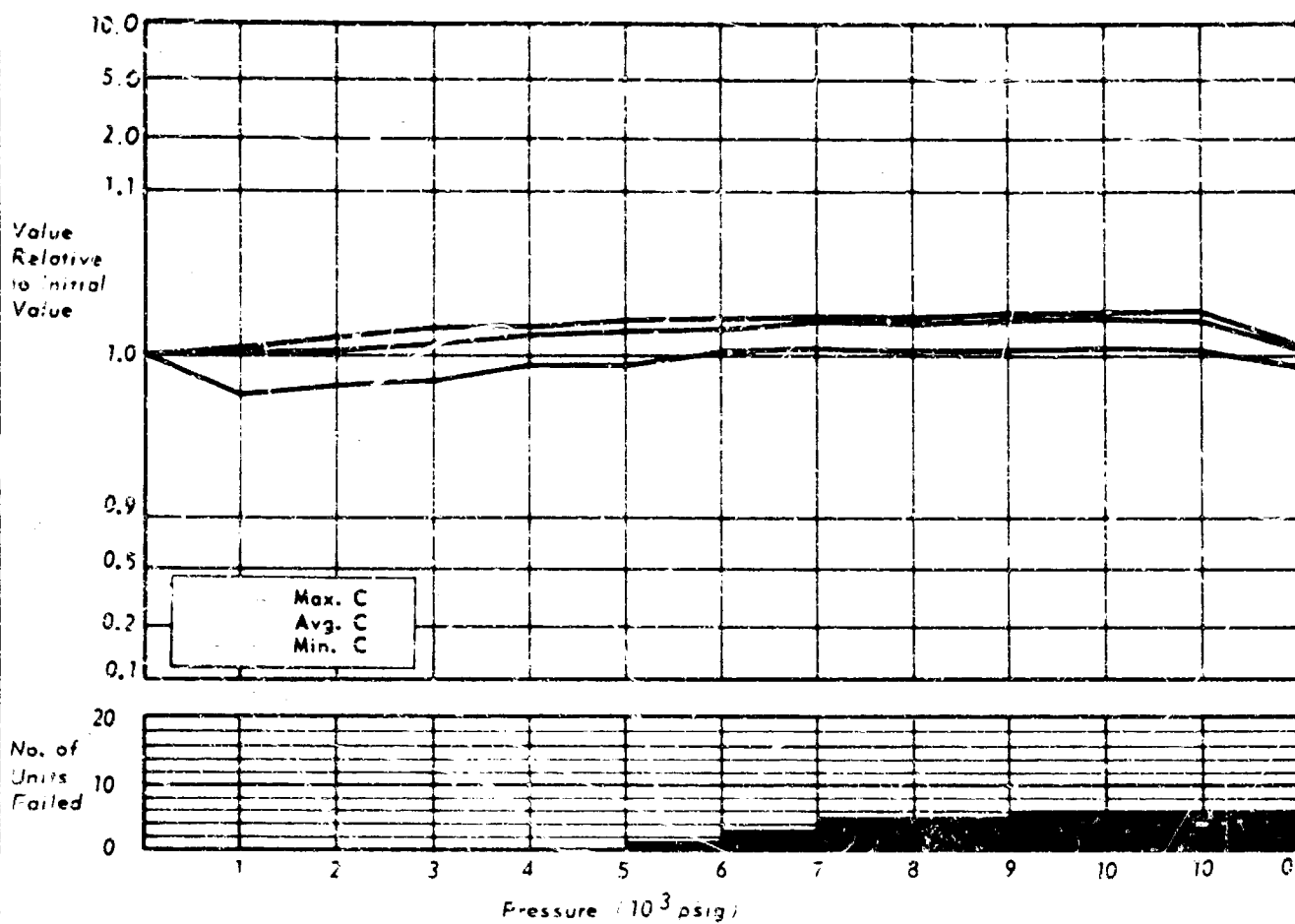
SOAK PERIOD: 16 hours at 10,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

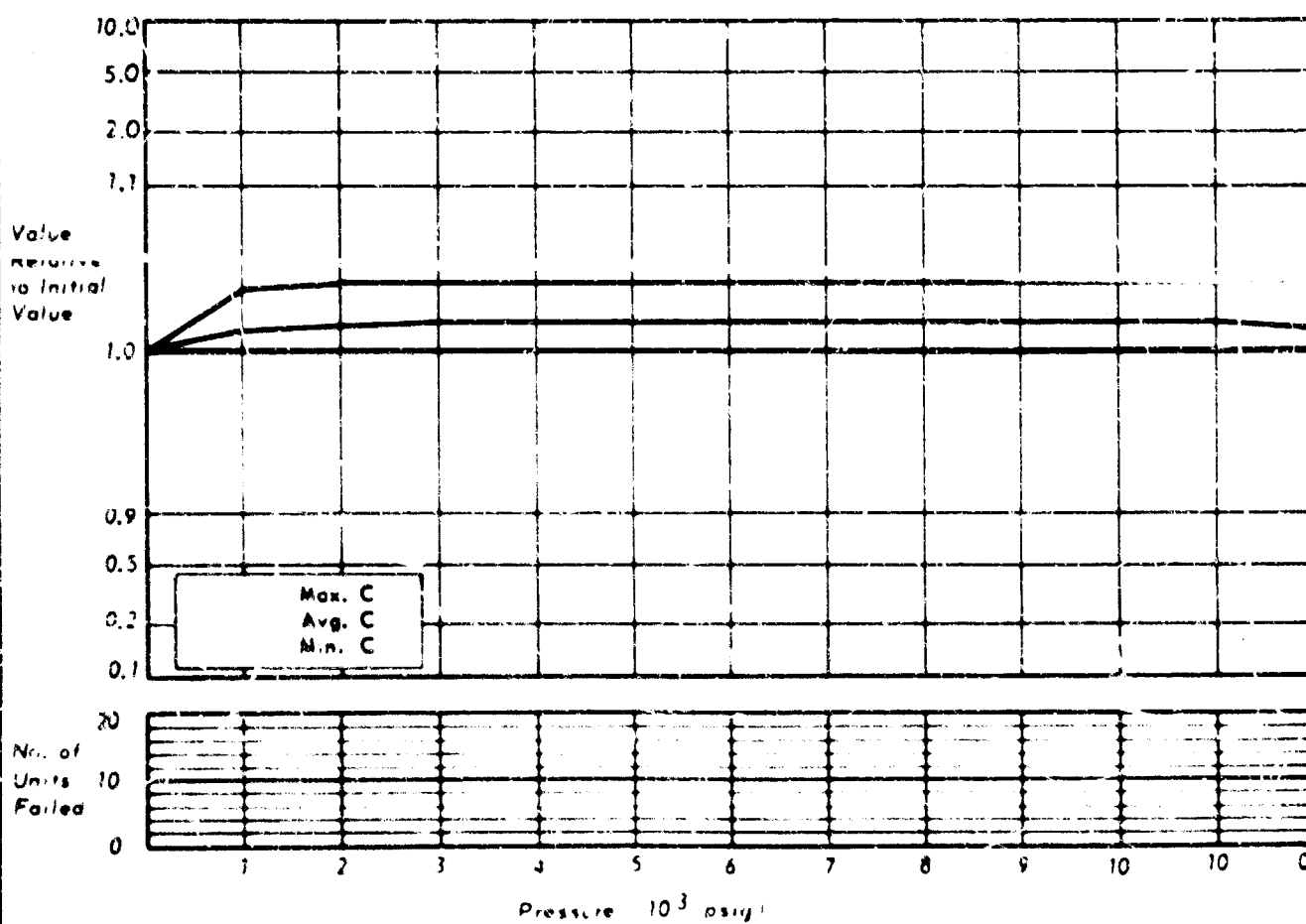
MFG. - CORNELL-DUBIER
 TYPE - CAPACITOR, DPM52P47, .47 μ F 120%, 200 VDCW
 DESCRIPTION - PAPER FILM, TUBULAR, RADIAL LEADS

CHART NO. 15
 NO. OF SAMPLES TESTED - 20



MFG. - CORNELL-DUBIER
 TYPE - CAPACITOR, PKM402, .002 μ F 120%, 400 VDCW
 DESCRIPTION - SOLID IMPREG, TUBULAR, AXIAL LEADS

CHART NO. 16
 NO. OF SAMPLES TESTED - 20



Cornell-Dubilier
DPMS 2P47
Capacitor

0.47 μ F $\pm$ 20%
200 VDCW

Paper, mylar
Tubular, radial lead
Dipped casing
1.6 x 0.73" diam

SOAK PERIOD: None

MECHANICAL: Visual inspection after completion of test showed hair-line cracks in the casing of three units and a chipped casing on one unit.

ELECTRICAL: Fourteen components indicated less than 10% change.

One component indicated a change greater than 50% with subsequent recovery at pressures shown on failure graph on opposite page.

FAILURES: Five components indicated a permanent change greater than 50% at the pressures shown on the failure graph on opposite page.



Cornell-Dubilier
PKM402
Capacitor

0.002 μ F $\pm$ 20%
400 VDCW

Solid impreg
Tubular, axial lead
Thermoset molded
1.0 x 0.32" diam

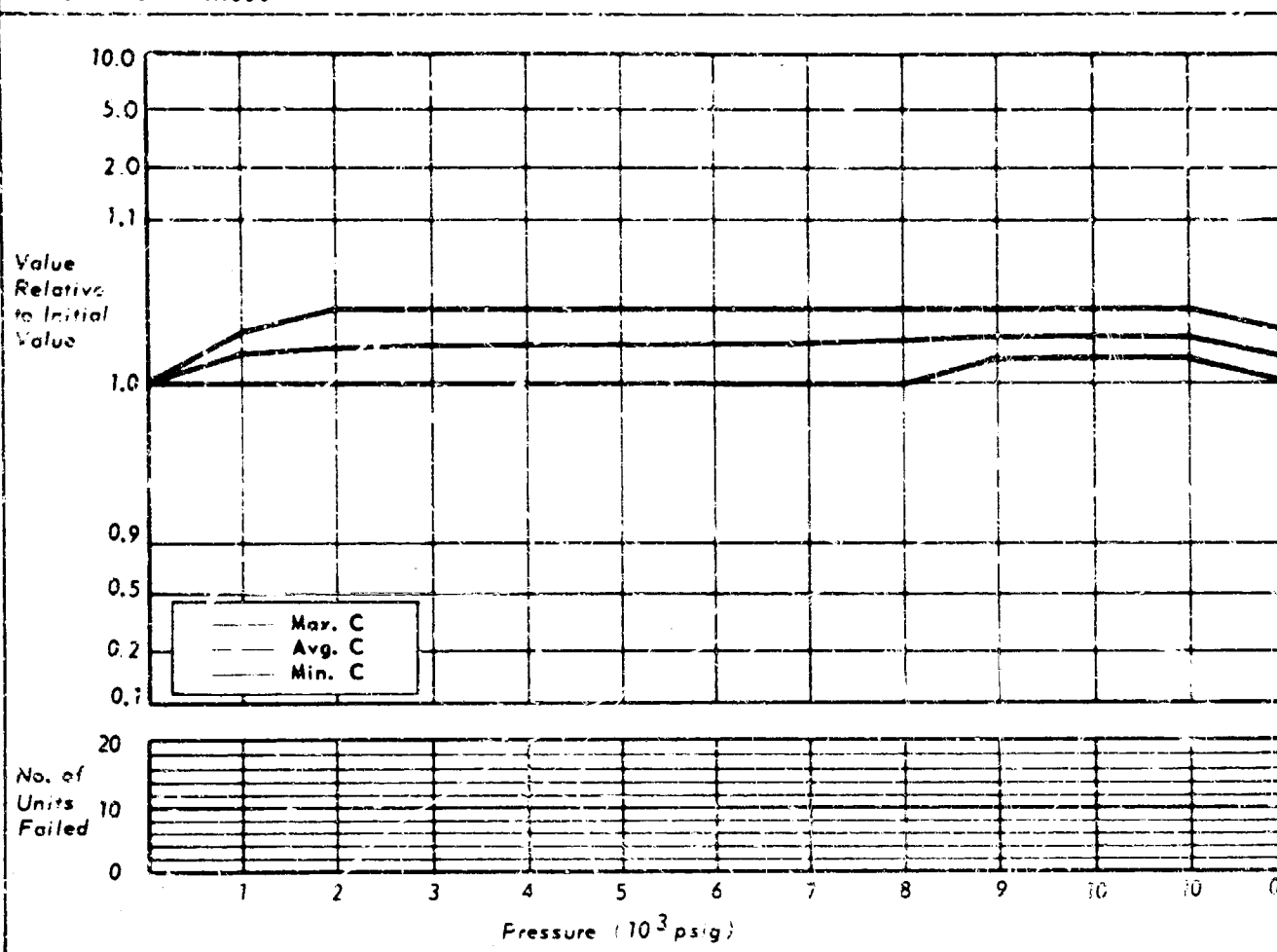
SOAK PERIOD: None

MECHANICAL: No apparent damage

ELECTRICAL: All components indicated less than 10% change.

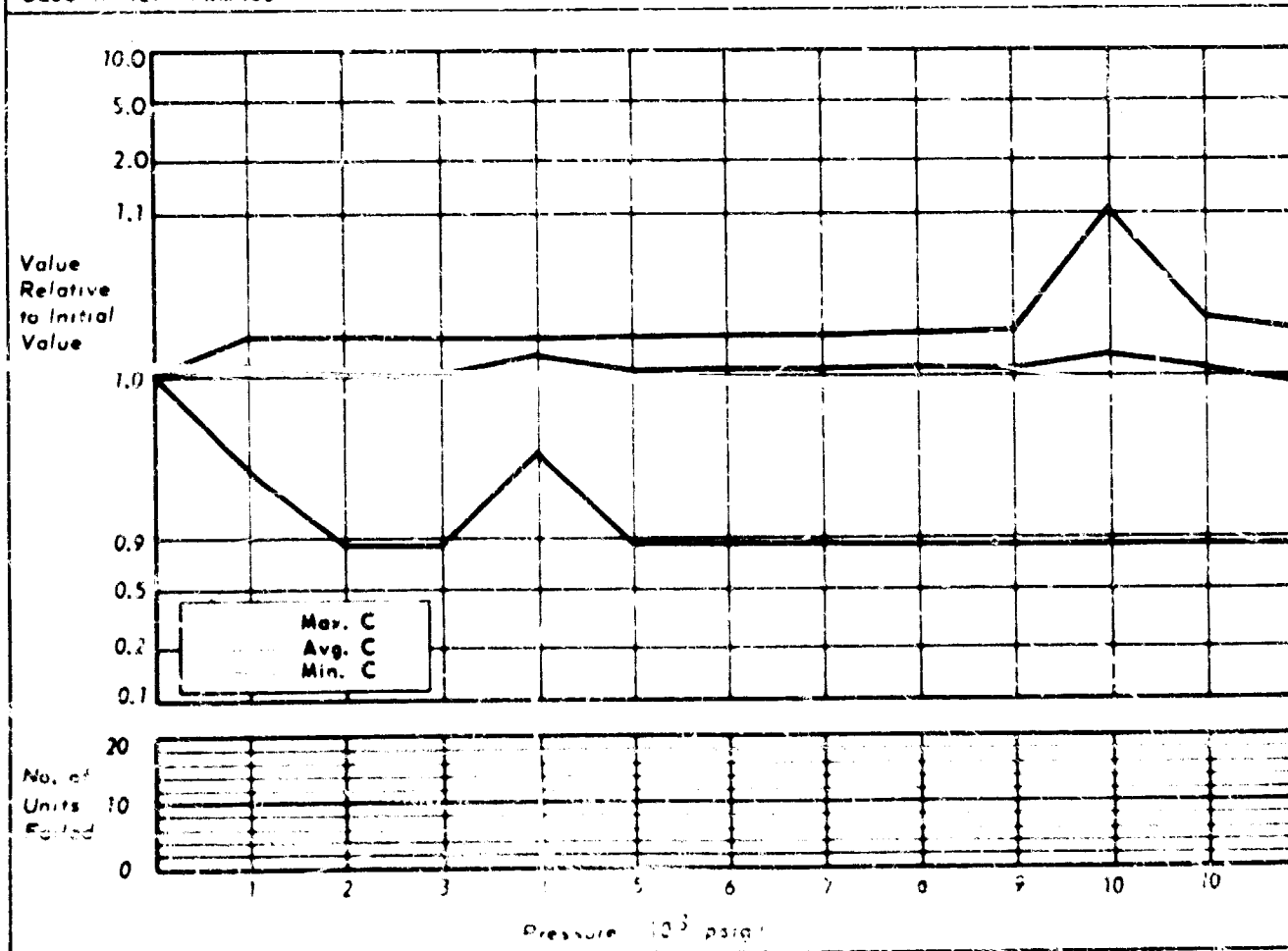
MFG. - CORNELL-DUBILIER
 TYPE - CAPACITOR
 DESCRIPTION - PKM006

CHART NO. 17
 NO. OF SAMPLES TESTED - 19



MFG. - CORNELL-DUBILIER
 TYPE - CAPACITOR
 DESCRIPTION - PKM425

CHART NO. 18
 NO. OF SAMPLES TESTED - 19



Cornell-Dubilier
PKM 406
Capacitor

0.006 μ F $\pm$ 20%
600 VDCW

Solid impreg
Tubular, axial lead
Thermoset molded
1.9 x 0.32" diam.

SOAK PERIOD: None

MECHANICAL: No apparent damage

ELECTRICAL: All components indicated less than 10% change.

Cornell-Dubilier
PKM 455
Capacitor

0.05 μ F $\pm$ 20%
400 VDCW

Solid impreg
Tubular, axial lead
Thermoset molded
1.25 x 0.437" diam.

SOAK PERIOD: None

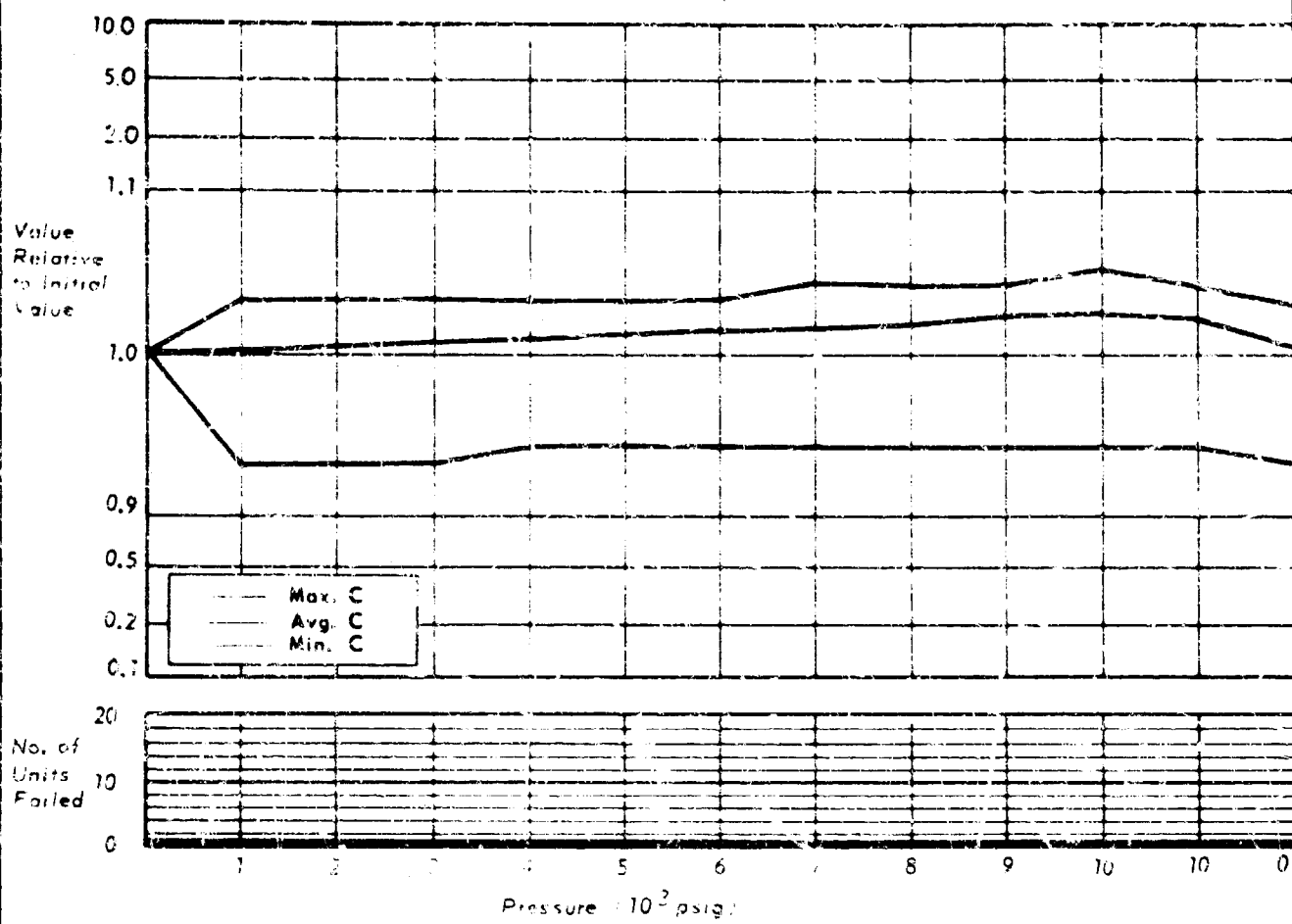
MECHANICAL: No apparent damage

ELECTRICAL: Eighteen components indicated less than 10% change.

One component indicated a change greater than 10% and less than 50%.

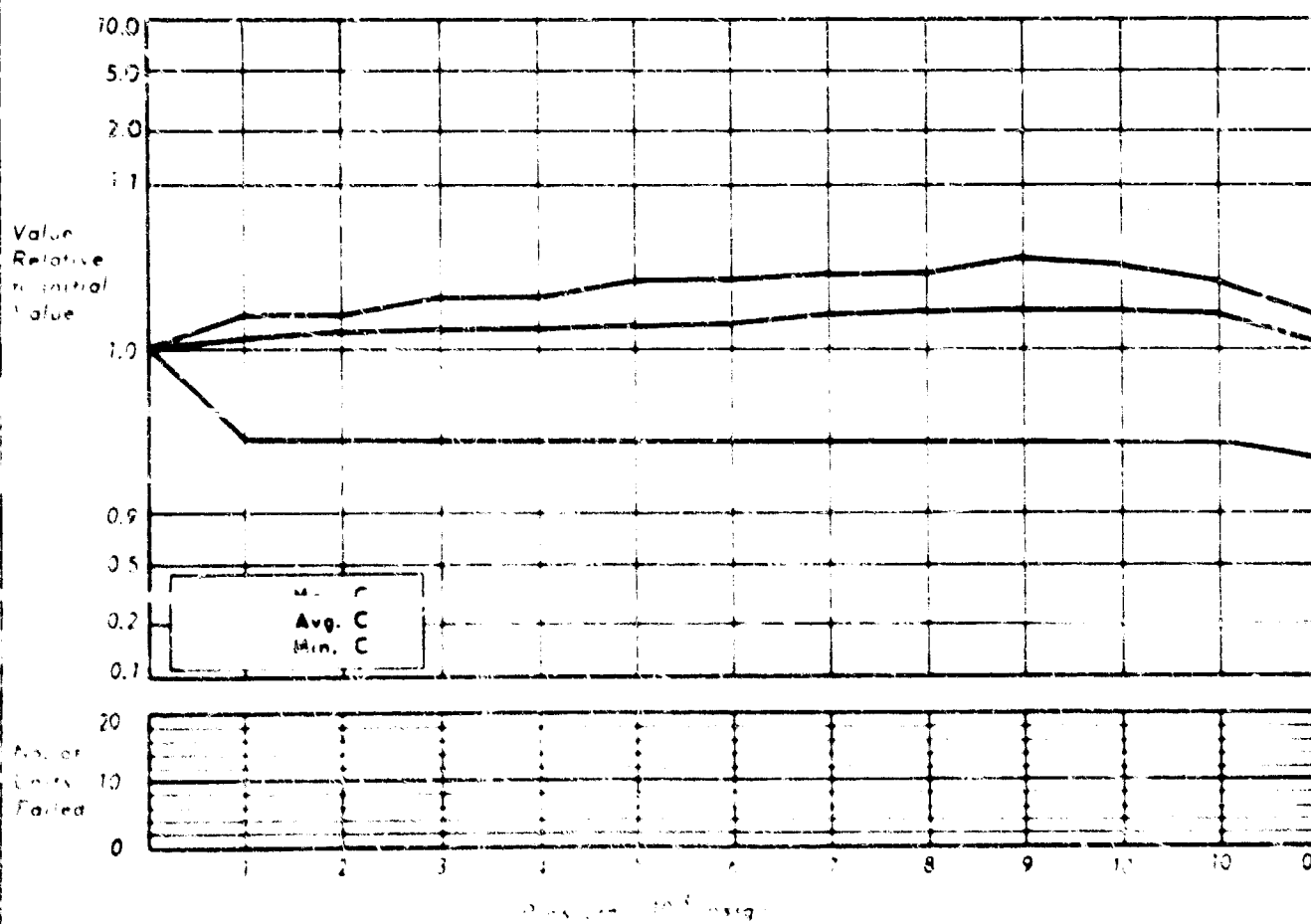
MFG. - CORNELL-DUBILIER
 TYPE - CAPACITOR
 DESCRIPTION - PKM2P1

CHART NO. 19
 NO. OF SAMPLES TESTED - 19



MFG. - CORNELL-DUBILIER
 TYPE - CAPACITOR
 DESCRIPTION - PKM8P1

CHART NO. 20
 NO. OF SAMPLES TESTED - 20



Cornell-Dubilier
PKM 2P1
Capacitor

0.1 μ F $\pm$ 20%
200 VDCW

Solid impreg
Tubular, axial lead
Thermoset molded
1.5 x 0.5" diam.

SOAK PERIOD: 15 hours at 10,000 psig

MECHANICAL: No apparent damage

ELECTRICAL: Eighteen components indicated less than 10% change.

FAILURES: One component indicated a permanent change greater than 50% at the pressures shown on the failure graph on opposite page.

Cornell-Dubilier
PKM 6P1
Capacitor

0.1 μ F $\pm$ 20%
600 VDCW

Solid impreg
Tubular, axial lead
Thermoset molded
1.6 x 0.32" diam.

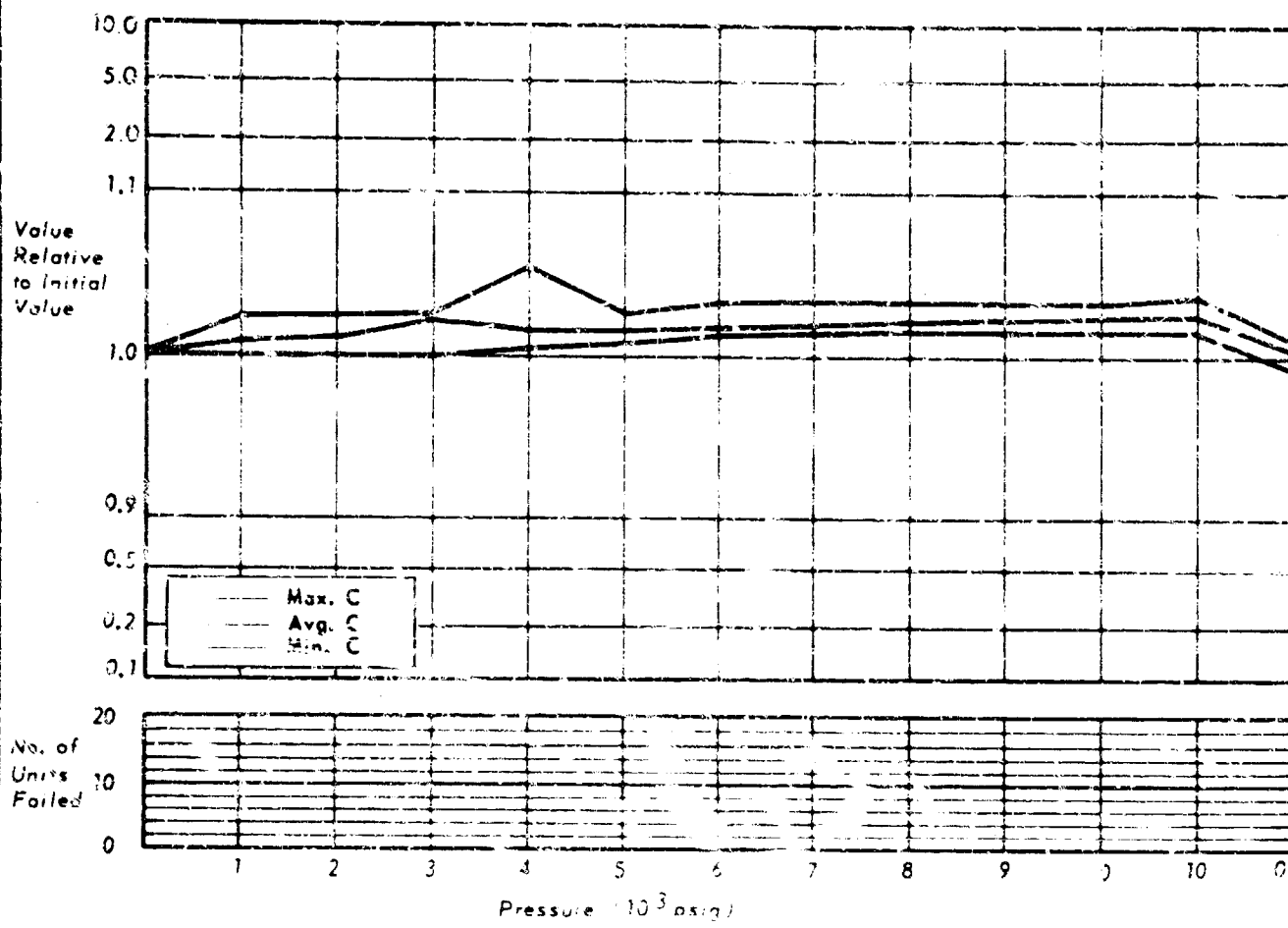
SOAK PERIOD: None

MECHANICAL: No apparent damage

ELECTRICAL: All components indicated less than 10% change.

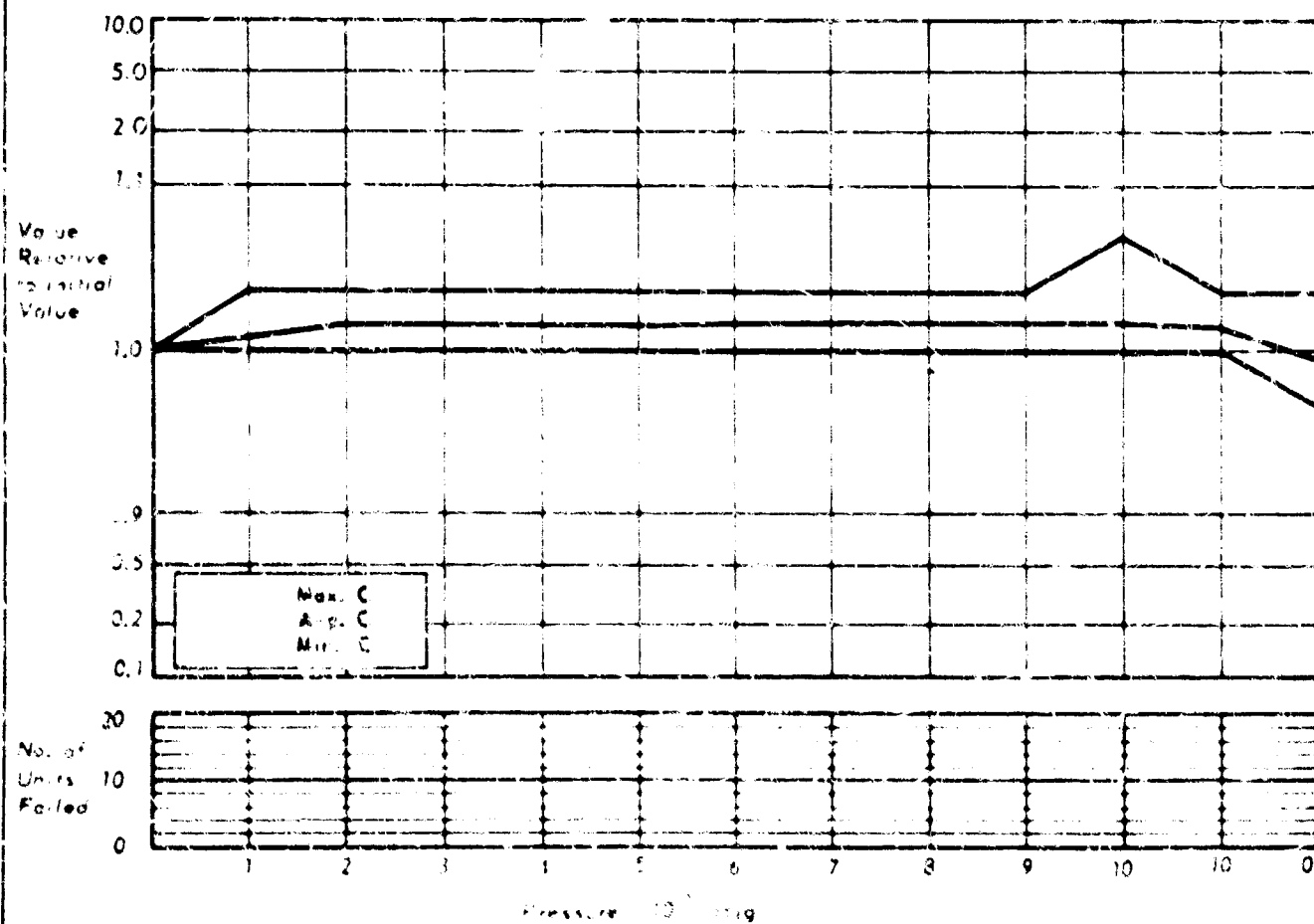
MFG. - CORNELL DUBILIER
 TYPE - CAPACITOR
 DESCRIPTION - PKM2P25

CHART NO. 21
 NO. OF SAMPLES TESTED - 20



MFG. - CORNELL DUBILIER
 TYPE - CAPACITOR
 DESCRIPTION - PKM2P25

CHART NO. 22
 NO. OF SAMPLES TESTED - 19



Cornell-Dubilier
PKM 2P25
Capacitor

0.25 μ F $\pm$ 20%
200 VDCW

Solid impreg
Tubular, axial lead
Thermoset molded
1.87 x 0.62" diam.

SOAK PERIOD: 16 hours at 8,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

Cornell-Dubilier
PKM 6P3
Capacitor

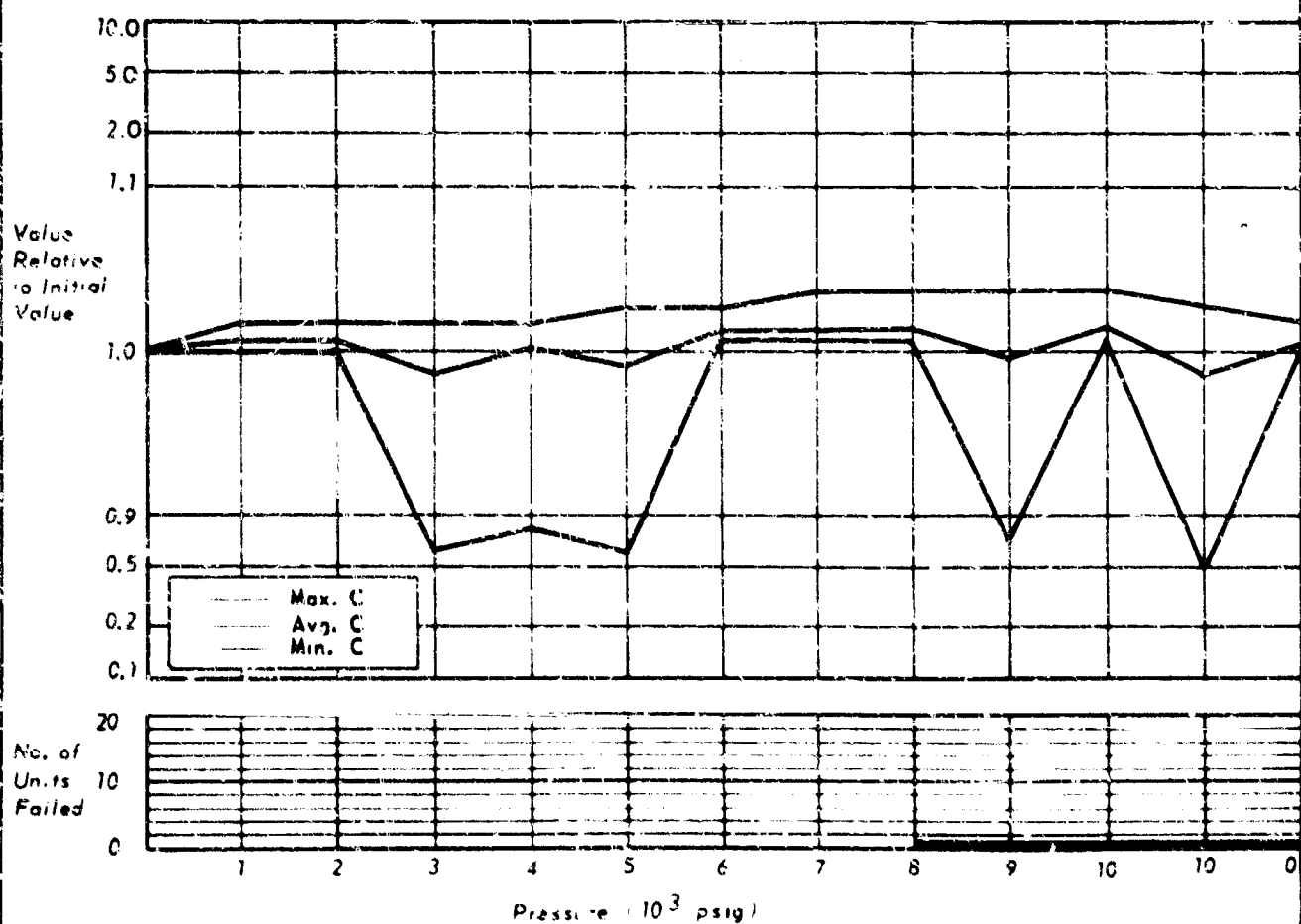
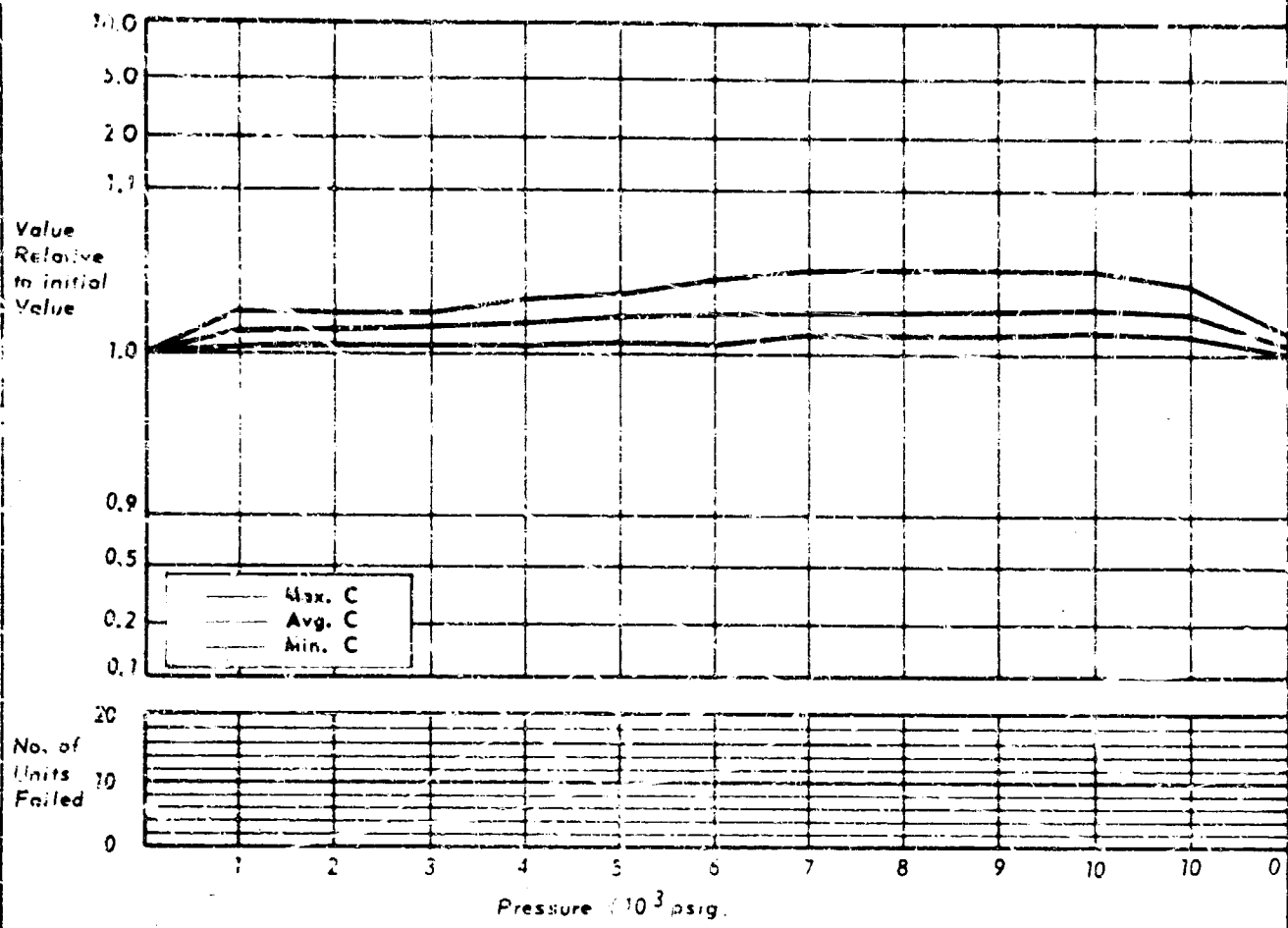
0.3 μ F $\pm$ 20%
400 VDCW

Solid impreg
Tubular, axial lead
Thermoset molded
1.56 x 0.56" diam.

SOAK PERIOD: 16 hours at 10,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.



Cornell-Dubilier
PKM 4P47
Capacitor

0.47 μ F $\pm$ 20%
400 VDCW

Solid impreg
Tubular, axial lead
Thermoset molded
1.94 x 0.68" diam.

SOAK PERIOD: None

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10%

Cornell-Dubilier
PKM 2W1
Capacitor

1.0 μ F $\pm$ 10%
200 VDCW

Solid impreg
Tubular, axial lead
Thermoset molded
2.125 x 1.0" diam.

SOAK PERIOD: None

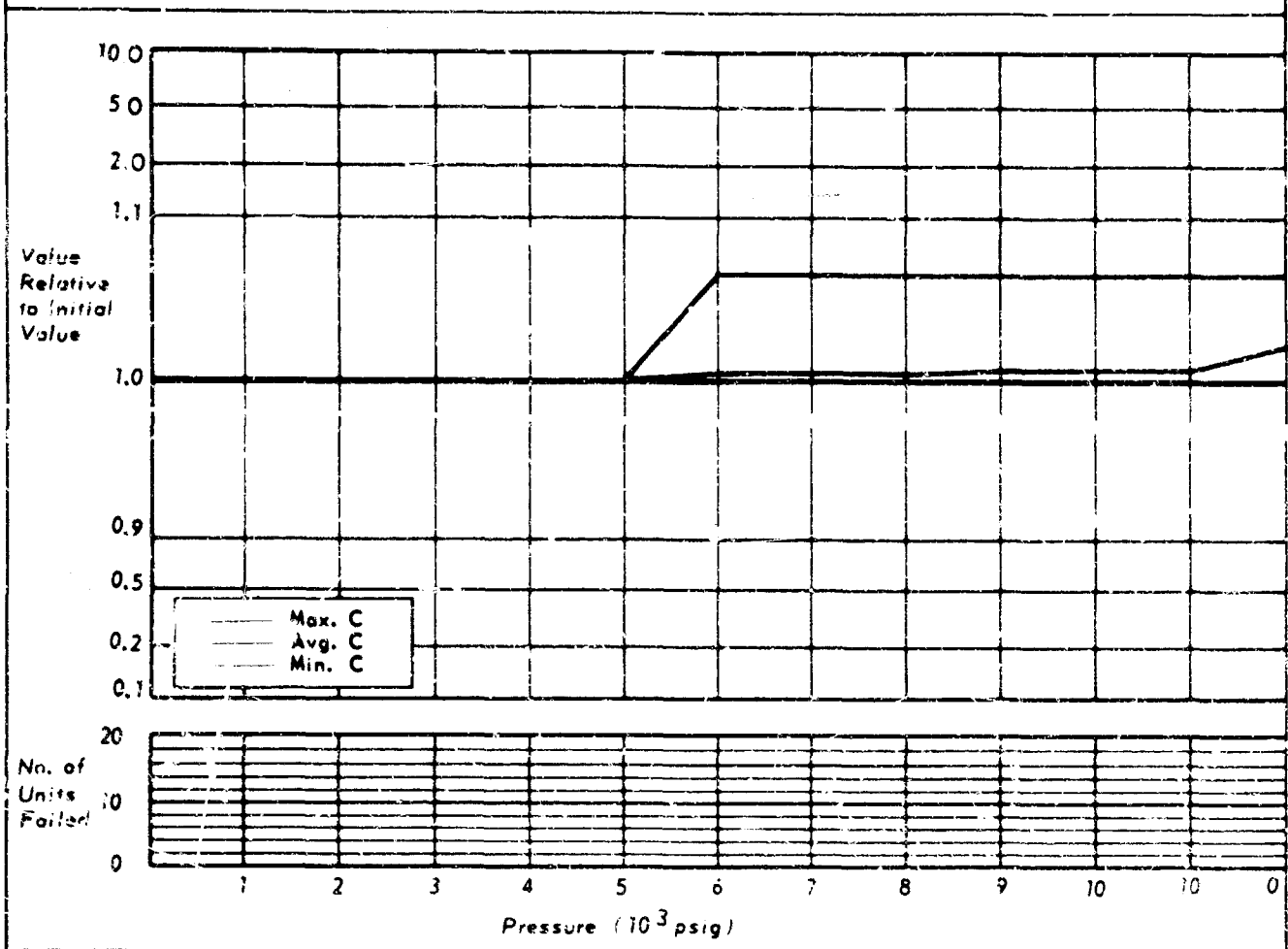
MECHANICAL: No apparent damage.

ELECTRICAL: Nineteen components indicated less than 10% change.

One component indicated a change greater than 50% with subsequent recovery at pressures shown on failure graph on opposite page. Recovery of the failing sample was on return to 0.

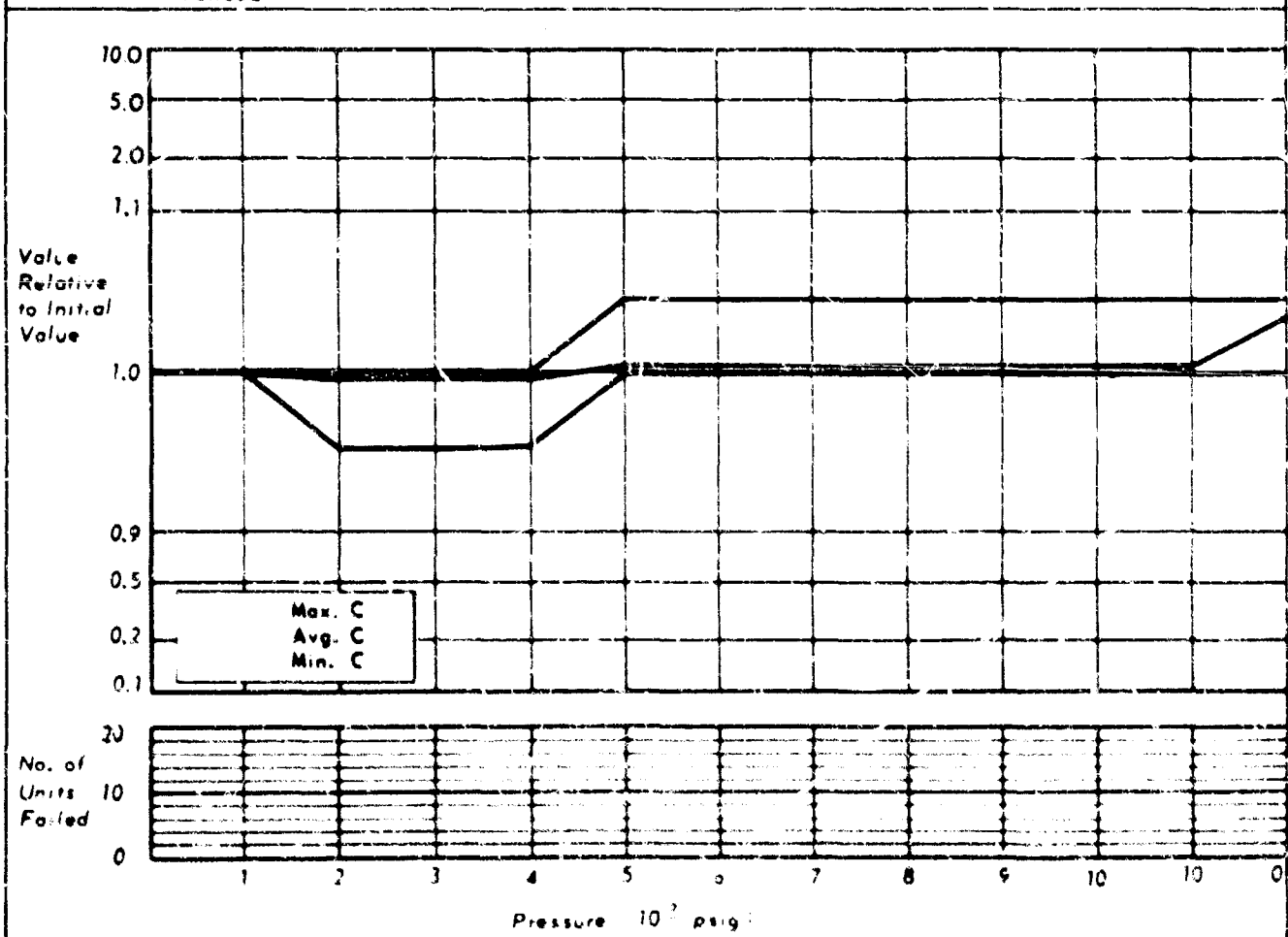
MFG. - CORNELL-DUBILIER
 TYPE - CAPACITOR
 DESCRIPTION - JB .001M-V

CHART NO. 25
 NO. OF SAMPLES TESTED - 20



MFG. - CORNELL-DUBILIER
 TYPE - CAPACITOR
 DESCRIPTION - F0M6D2M

CHART NO. 26
 NO. OF SAMPLES TESTED - 20



Cornell-Dubilier
JB
Capacitor

0.001 $\mu\text{F} \pm 20\%$
Voltage as requested

Ceramic, disc
Fluorinated
Glass encaps
0.437" diam x 0.15" th.

SOAK PERIOD: None

MECHANICAL: No apparent damage

ELECTRICAL: All components indicated less than 10% change.

Cornell-Dubilier
FGH 6D2M
Capacitor

0.002 $\mu\text{F} \pm 15\%$
500 VDCW

Ceramic, disc
Fluorinated
Glass encaps
0.29" diam x 0.16" th.

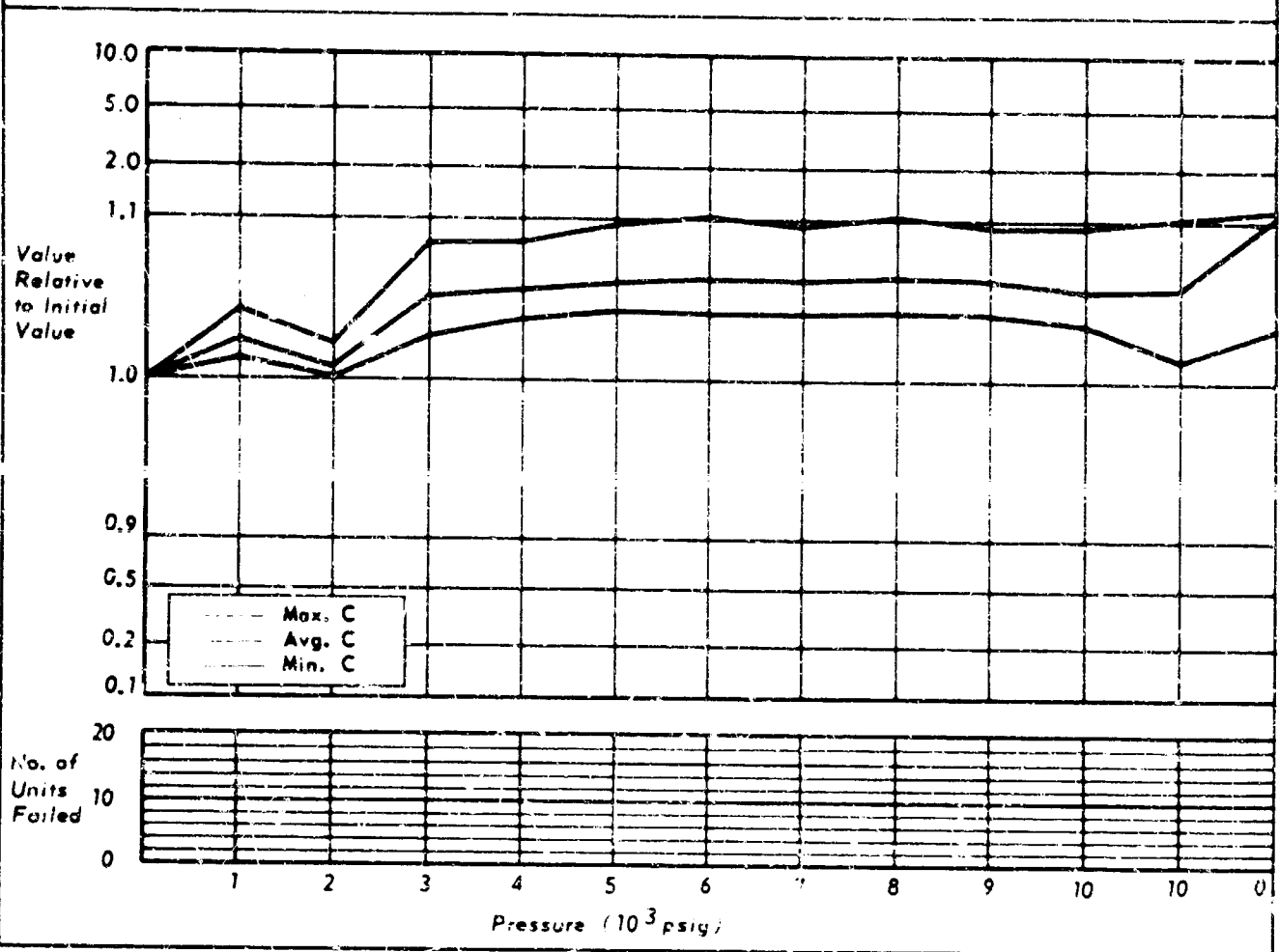
SOAK PERIOD: 16 hours at 10,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

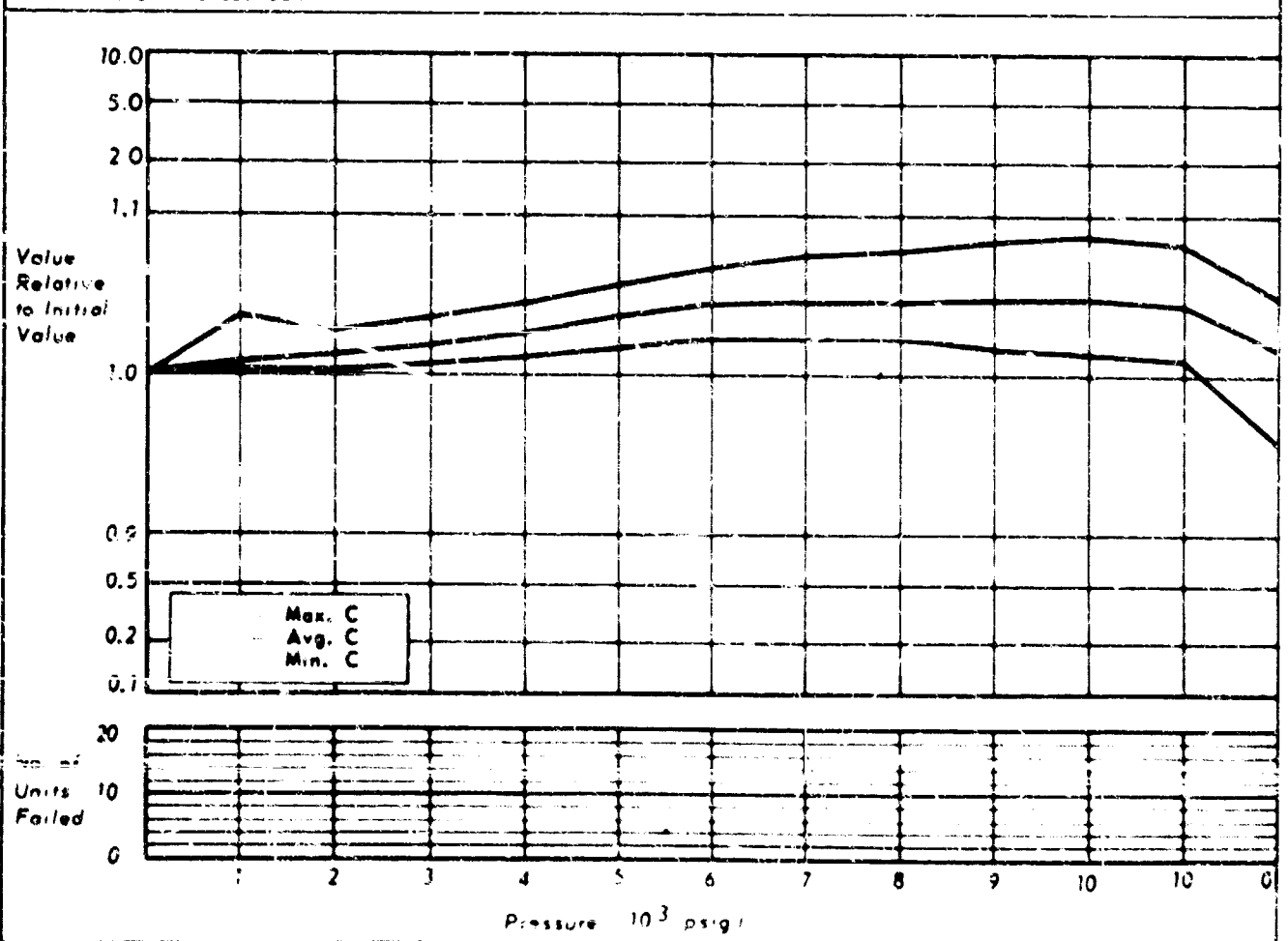
MFG. - CORNELL-DUBILIER
 TYPE - CAPACITOR
 DESCRIPTION - 5YA.016MV

CHART NO. 27
 NO. OF SAMPLES TESTED - 18



MFG. - CORNELL-DUBILIER
 TYPE - CAPACITOR
 DESCRIPTION - M5.05/100V

CHART NO. 28
 NO. OF SAMPLES TESTED - 18



Cornell-Dubilier
BYA 651
Capacitor

0.01 μ F GMV
600 VDCW

Ceramic, disc
Wax impreg
Phenolic dip
0.62 diam x 0.15" th.

SOAK PERIOD: None

MECHANICAL: No apparent damage.

ELECTRICAL: Eighteen components indicated less than 10% change.

One component indicated a change greater than 10% and less than 50%.

Cornell-Dubilier
H5
Capacitor

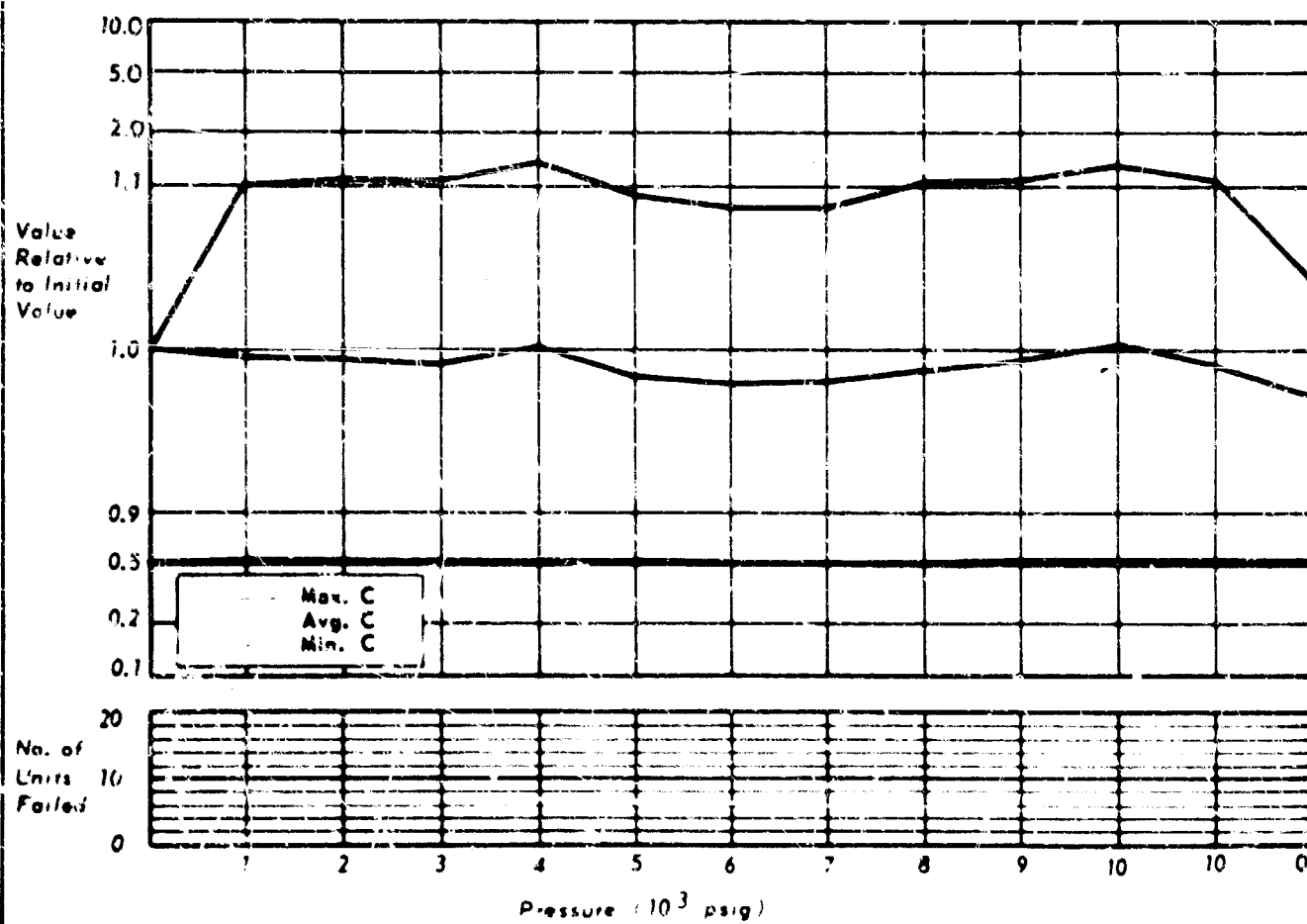
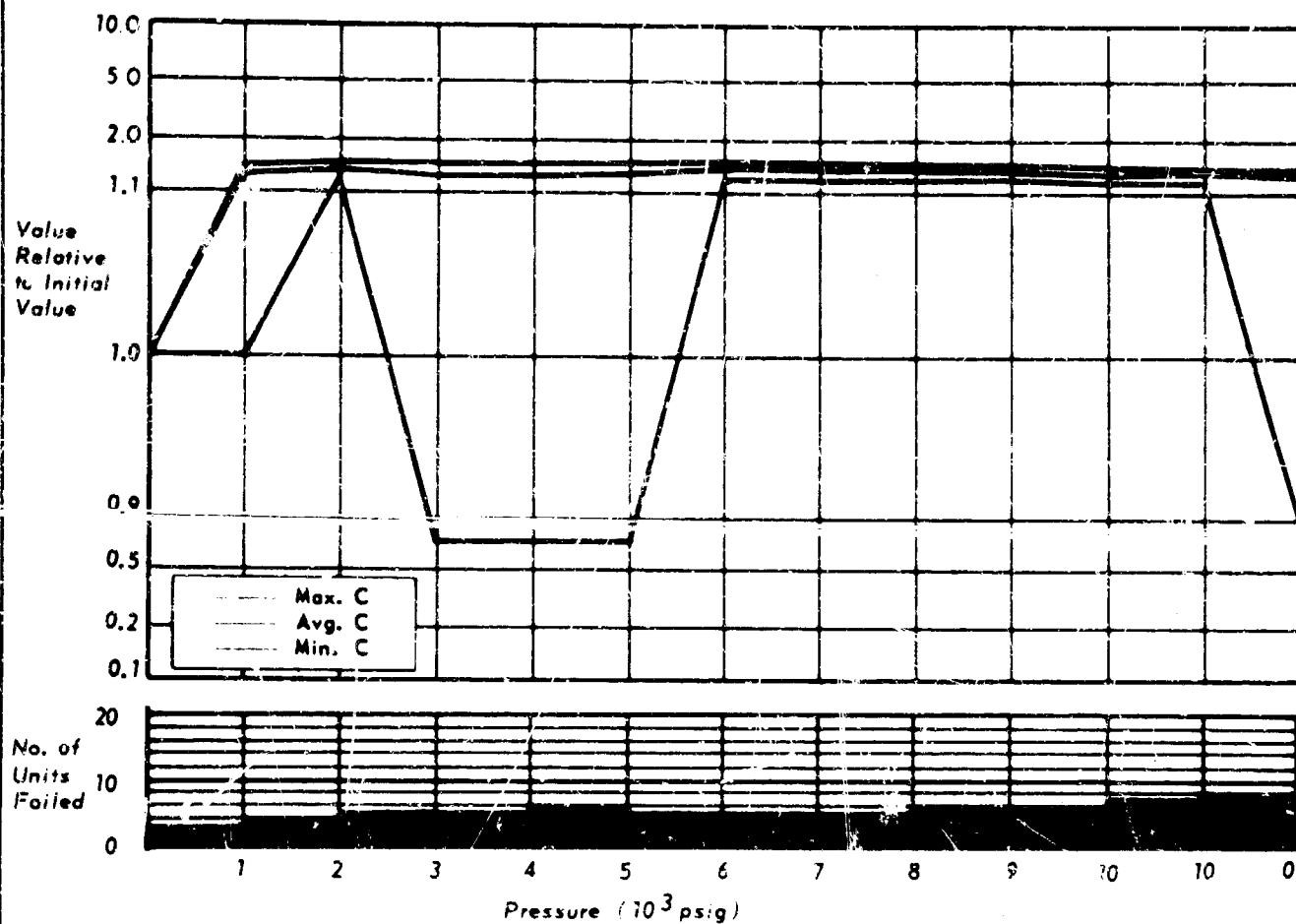
0.05 μ F $\begin{smallmatrix} +80 \\ -20 \end{smallmatrix}$ %
100 VDCW

Ceramic disc
Wax impreg
Phenolic dip
0.625 diam x 0.125" th.

SOAK PERIOD: None

MECHANICAL: No apparent damage

ELECTRICAL: All components indicated less than 10% change.



Cornell-Dubilier

5.0 μ F

Electrolytic

BWH S-150

150 V

Tubular, axial lead

Capacitor

1.58 x 0.5" diam

SOAK PERIOD: 15.5 hours at 10,000 psig.

MECHANICAL: Visual inspection after completion of test showed deformation of the metal casing and displacement of end seals on eighteen components.

ELECTRICAL: Ten components indicated a change greater than 10% and less than 50%.

Five components indicated a change greater than 50% with subsequent recovery at pressures shown on failure graph on opposite page.

FAILURES: Five components indicated a permanent change greater than 50% at the pressures shown on the failure graph on opposite page.



Cornell-Dubilier

25.0 μ F

Electrolytic

BWH 25-300

300 V

Tubular, axial lead

Capacitor

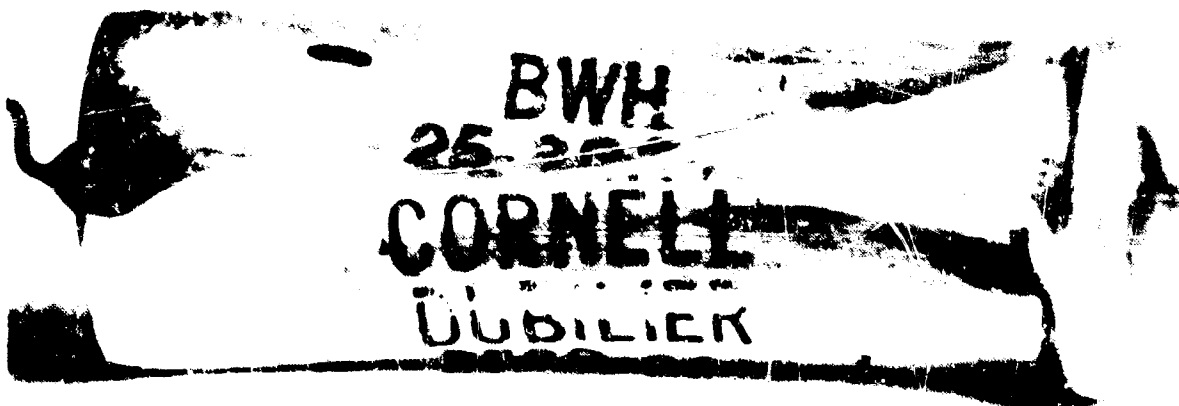
Ultrapurity foil

2.125 x 0.75" diam

SOAK PERIOD: None

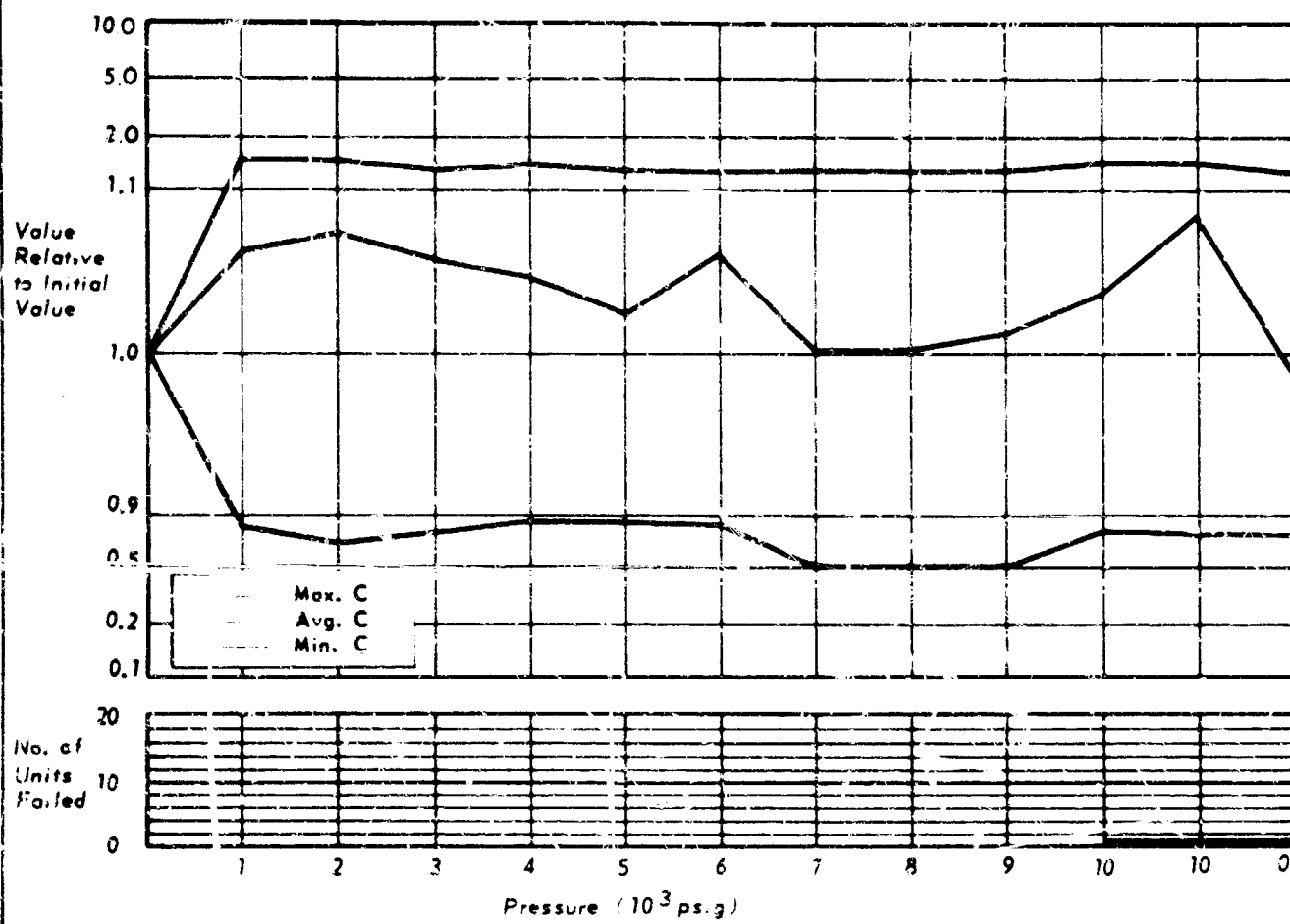
MECHANICAL: Visual inspection after completion of test showed slight deformation of all metal cases. One seal appeared ruptured as evidenced by an oil deposit in the external teflon case.

ELECTRICAL: All components indicated a change greater than 10% and less than 50%.



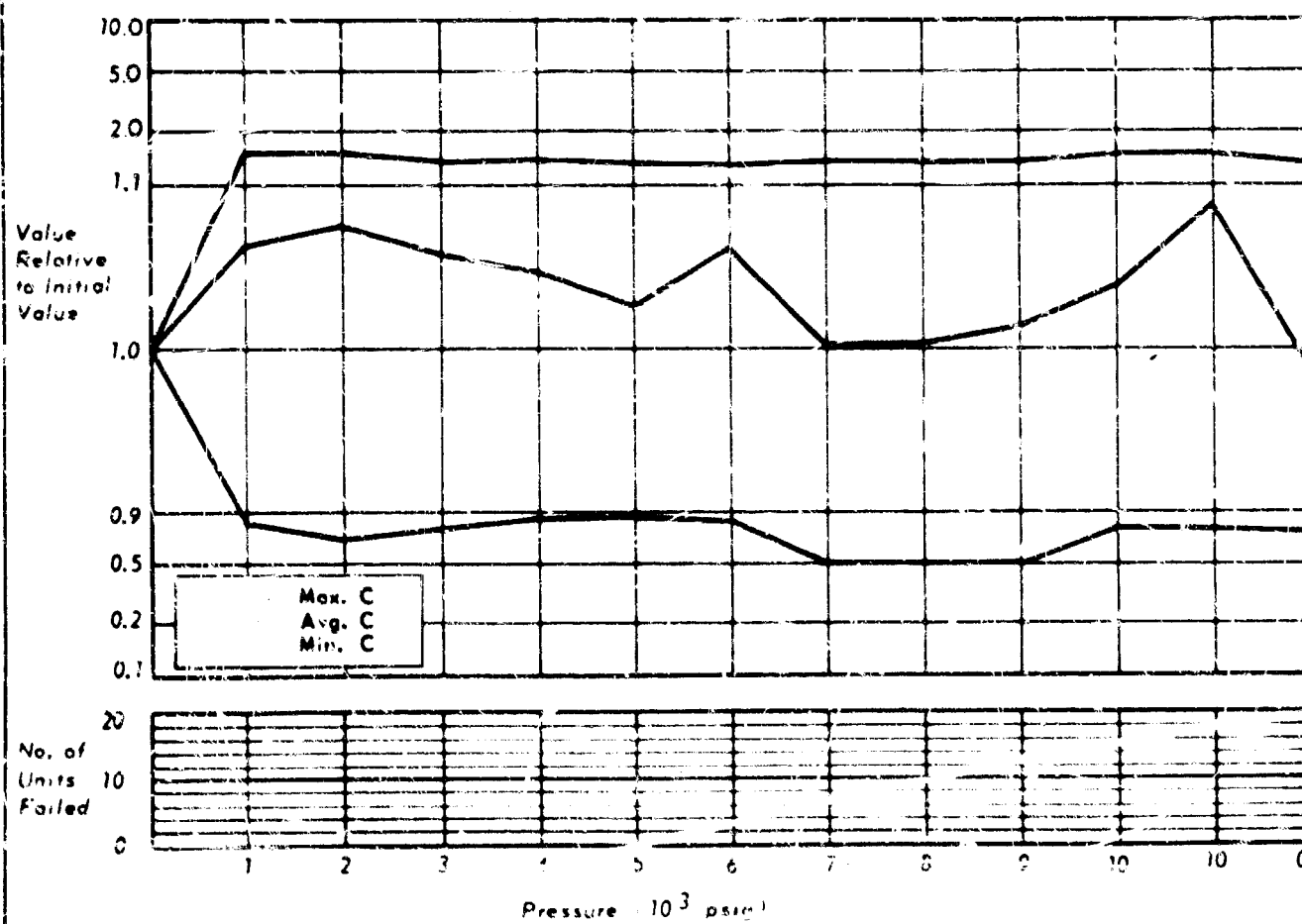
MFG. - CORNELL-DUBILIER
 TYPE - CAPACITOR
 DESCRIPTION - 8WH 50-50

CHART NO. 31
 NO. OF SAMPLES TESTED - 20



MFG. - CORNELL-DUBILIER
 TYPE - CAPACITOR
 DESCRIPTION - NLW 10-12

CHART NO. 32
 NO. OF SAMPLES TESTED - 19



Cornell-Dubilier

50.1 μ F

Electrolytic

BWH 50-50

50 WV

Tubular, axial lead

Capacitor

Aluminum foil

1.62 x 0.62" diam

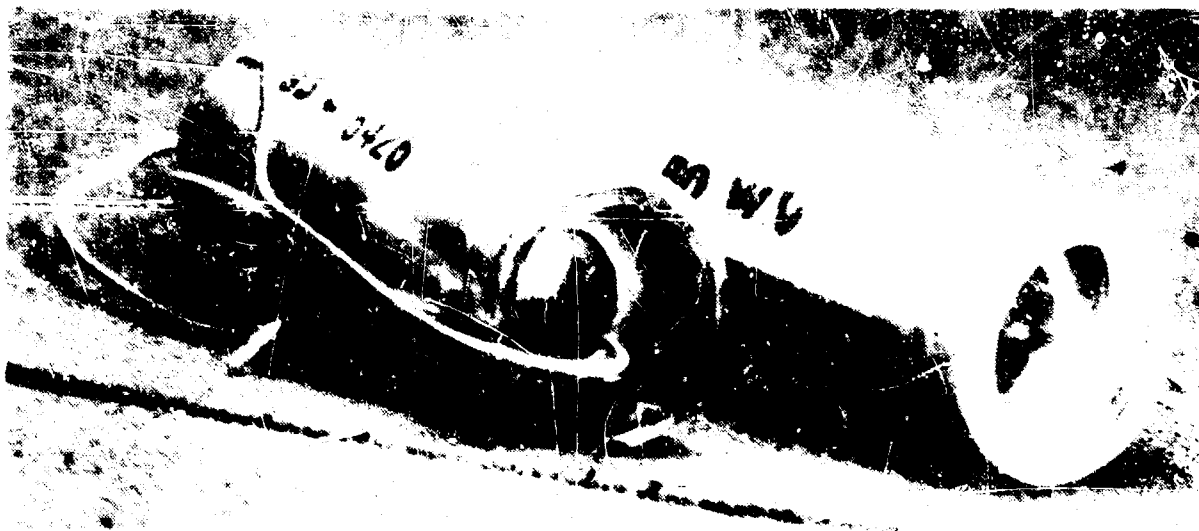
SOAK PERIOD: 15.5 hours at 10,000 psig.

MECHANICAL: Visual inspection after completion of test showed slight deformation of three metal cases, and seal displacement of five samples, and insulation extrusion of two samples.

ELECTRICAL: Nine components indicated less than 10% change.

Ten components indicated a change greater than 10% and less than 50%.

FAILURES: One component indicated a permanent change greater than 50% at the pressures shown on the failure graph on opposite page.



Cornell-Dubilier

10 μ F $\begin{smallmatrix} +15 \\ -10 \end{smallmatrix}$ %
12 V

Electrolytic

NLW 10-12

Tubular, axial lead

Capacitor

1.58 x 0.5" diam

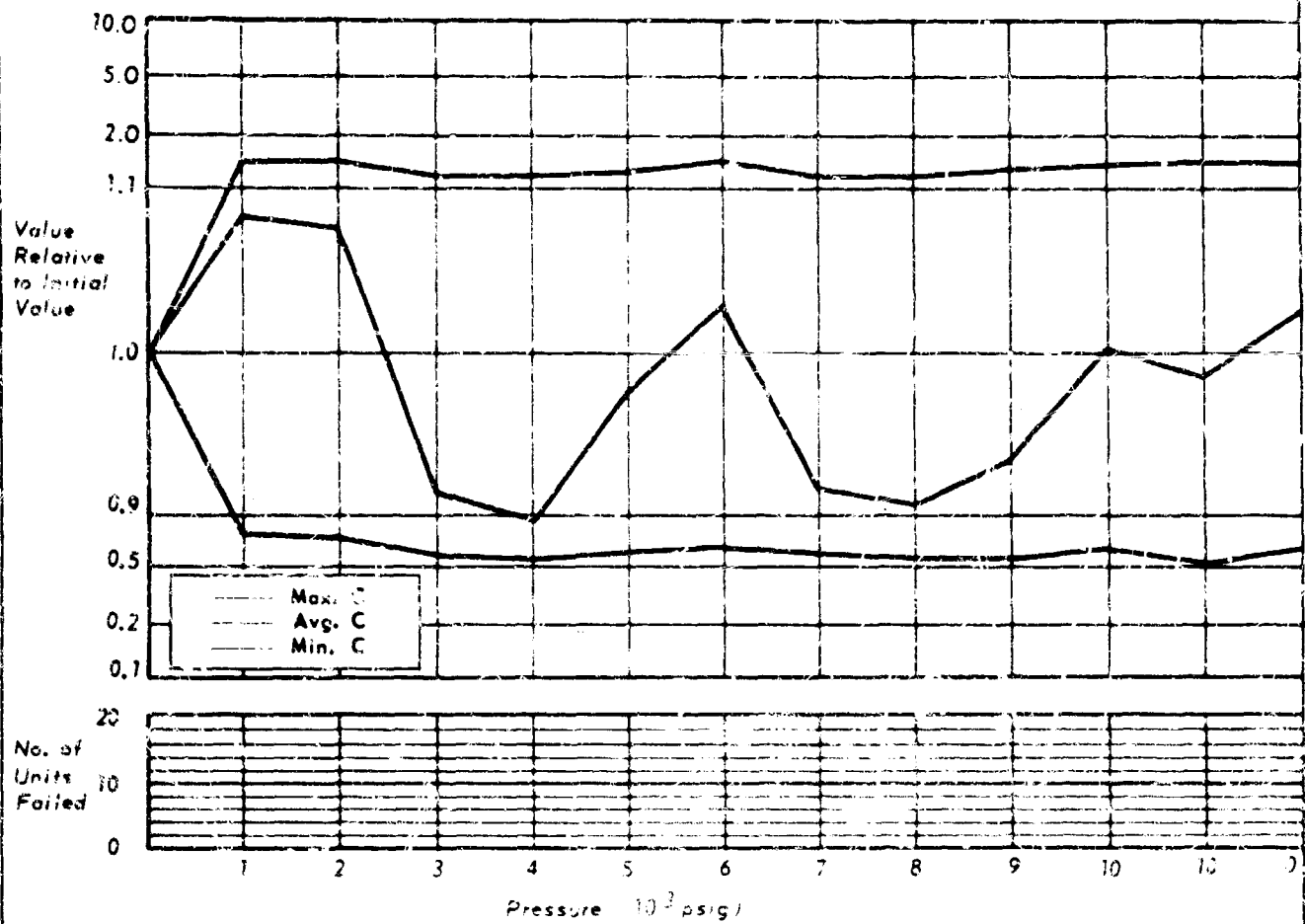
SOAK PERIOD: 16 hours at 3,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: One component indicated a change greater than 10% and less than 50%.
All other components had less than 10% change.

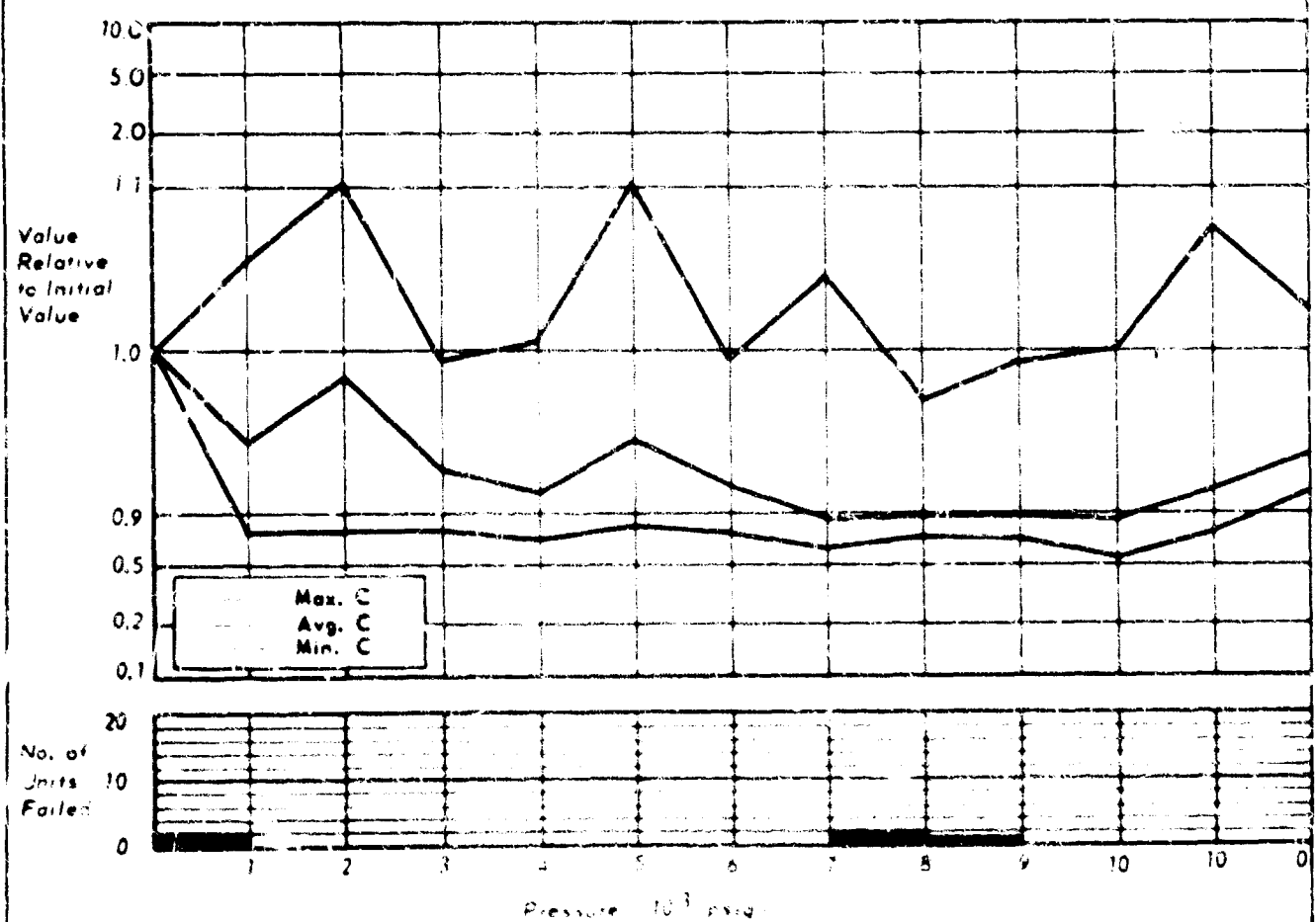
MFG.-CORNELL-DUBILIER
 TYPE-CAPACITOR
 DESCRIPTION-NLW-50-12

CHART NO. 33
 NO. OF SAMPLES TESTED-20



MFG.-CORNELL-DUBILIER
 TYPE-CAPACITOR
 DESCRIPTION-NLW-55-50

CHART NO. 34
 NO. OF SAMPLES TESTED-20



Cornell-Dubilier
NLW 50-12
Capacitor

50.0 μ F ± 150 %
12 V

Electrolytic
Tubular, axial lead
Aluminum foil
0.625 x 0.375" diam.

SOAK PERIOD: 16 hours at 3,000 psig.

MECHANICAL: No apparent damage

ELECTRICAL: Ten components indicated less than 10% change.

Ten components indicated a change greater than 10% and less than 50%.

Cornell-Dubilier
NLW 85-50
Capacitor

85.0 μ F
50 WV

Electrolytic
Tubular, axial lead
Aluminum foil
1.5 x 0.375" diam.

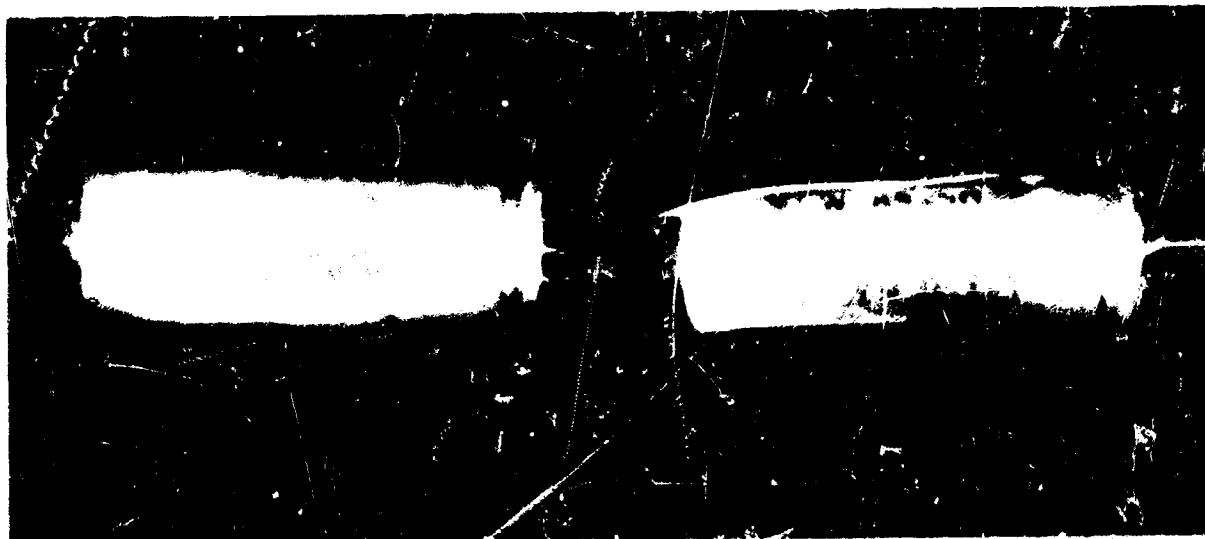
SOAK PERIOD: 16 hours at 3,000 psig.

MECHANICAL: Visual inspection following completion of tests showed slight deformation of the metal cases of nine components. Seven of the damaged components remained functional throughout the entire test.

ELECTRICAL: Eleven components indicated less than 10% change.

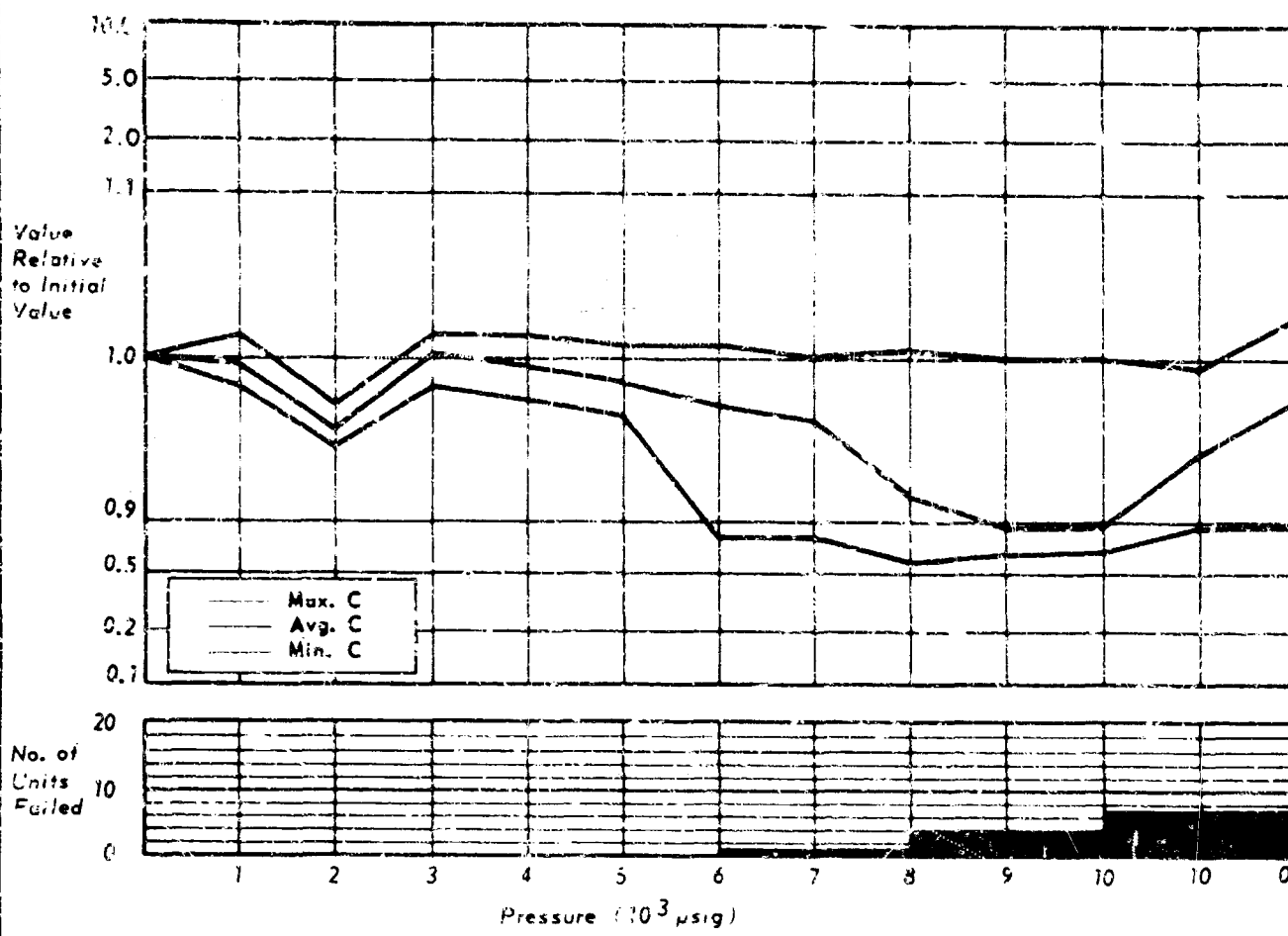
Seven components indicated a change greater than 10% and less than 50%.

Two components indicated a change greater than 50% with subsequent recovery at pressures shown on failure graph on opposite page.



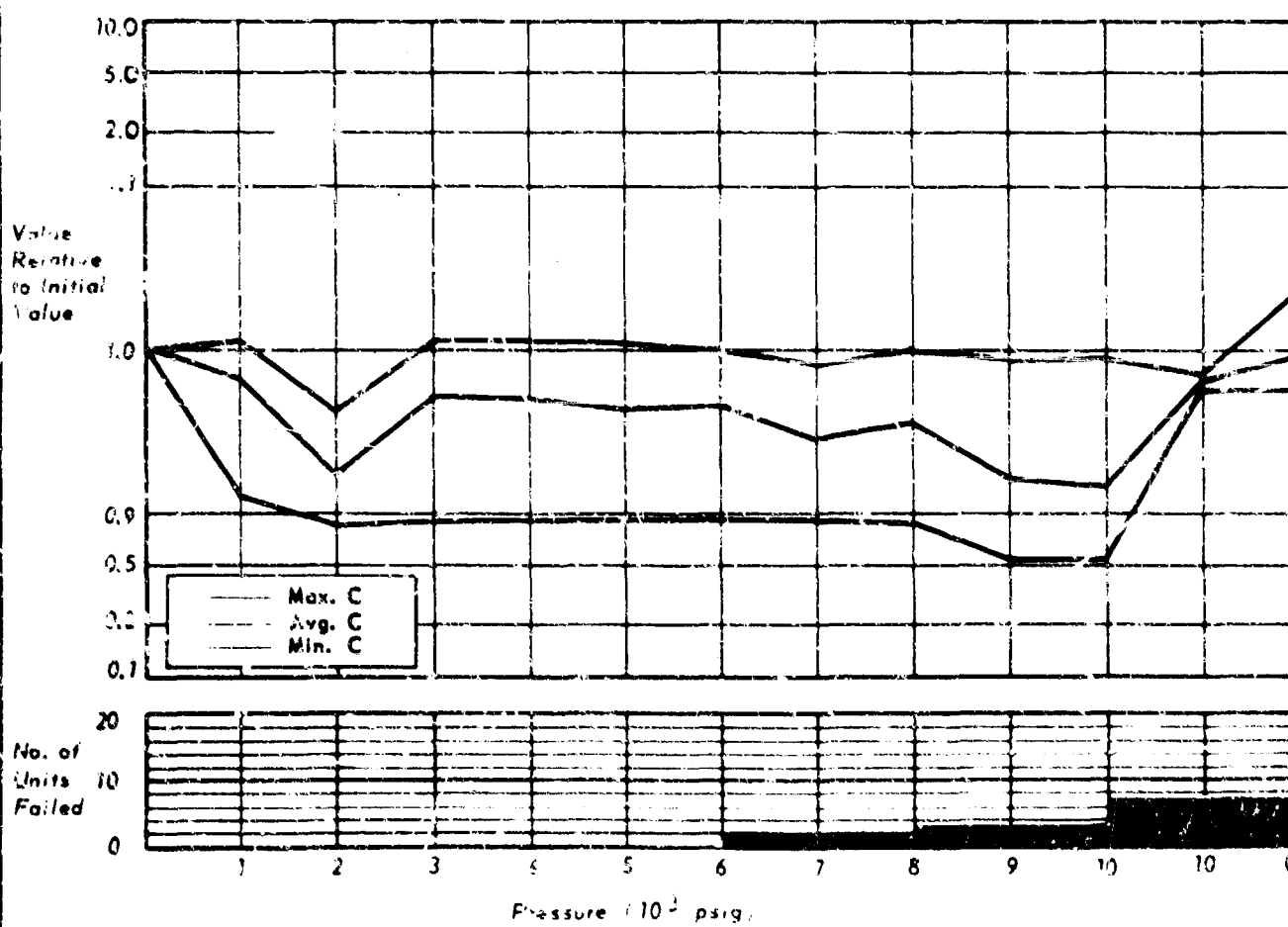
MFG. - CORNELL-DUBILIER
 TYPE - CAPACITOR
 DESCRIPTION - CK06, .0010 μ F

CHART NO. 35
 NO. OF SAMPLES TESTED - 10



MFG. - CORNELL-DUBILIER
 TYPE - CAPACITOR
 DESCRIPTION - CK06, .0022 μ F

CHART NO. 36
 NO. OF SAMPLES TESTED - 10



Cornell-Dubilier
CK06
Capacitor

0.0018 μ F $\pm$ 10%
200 VDCW

Ceramic
Phenolic case
Square, radial lead
0.3 x 0.03 x 0.1" th.

SOAK PERIOD: 15.5 hours at 10,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: Two components indicated less than 10% change.

One component indicated a change greater than 10% and less than 50%.

FAILURES: Six components indicated a permanent change greater than 50% at the pressures shown on the failure graph on opposite page.

Cornell-Dubilier
CK06
Capacitor

0.0022 μ F $\pm$ 10%
200 VDCW

Ceramic
Phenolic case
Square, radial lead
0.3 x 0.3 x 0.1" th.

SOAK PERIOD: 15.5 hours at 10,000 psig.

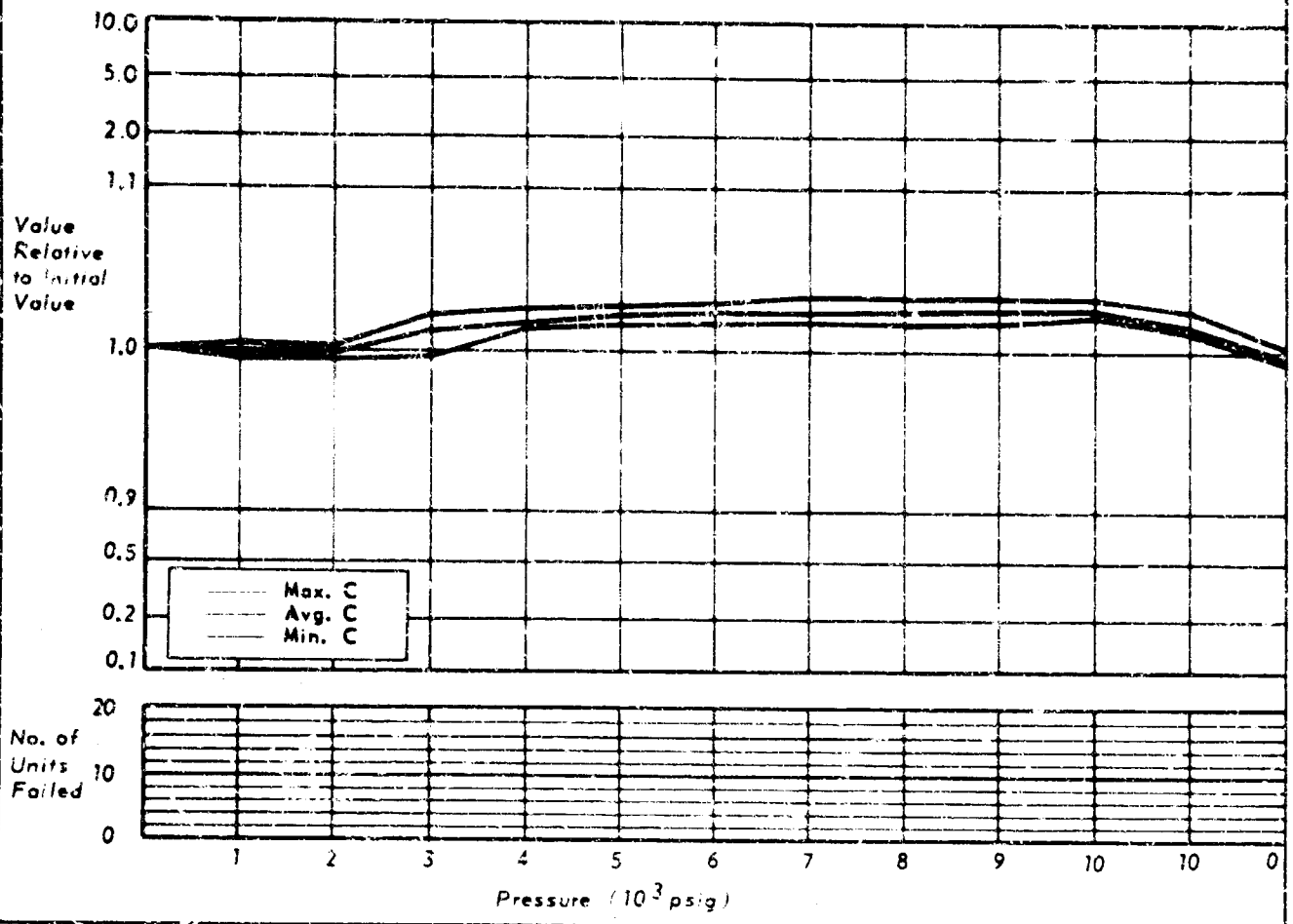
MECHANICAL: No apparent damage.

ELECTRICAL: Three components indicated less than 10% change.

FAILURES: Seven components indicated a permanent change greater than 50% at the pressures shown on the failure graph on opposite page.

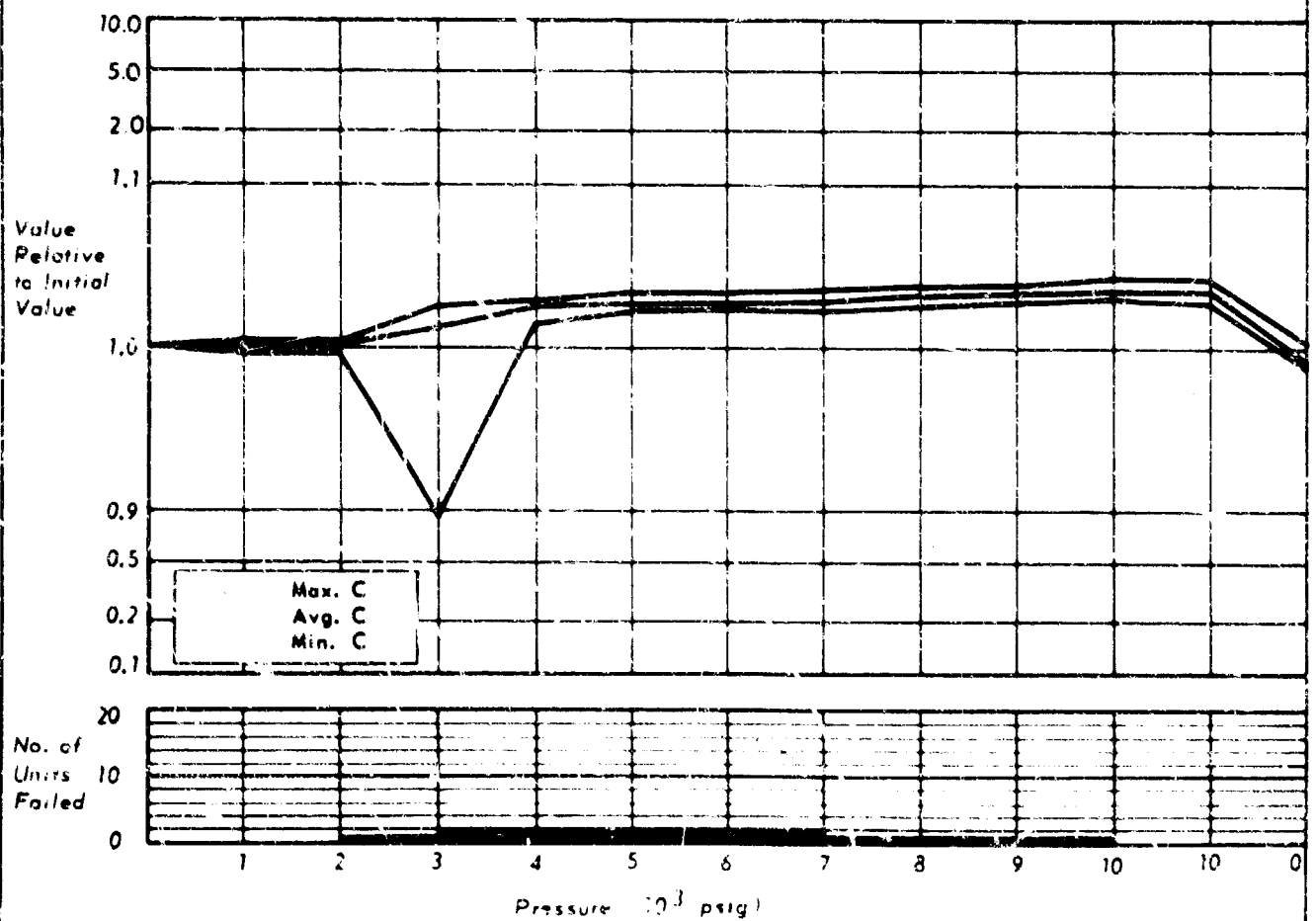
MFG. - CORNELL DUBILIER
 TYPE - CAPACITOR
 DESCRIPTION - MTYNIC6/3M

CHART NO. 37
 NO. OF SAMPLES TESTED - 19



MFG. - CORNELL DUBILIER
 TYPE - CAPACITOR
 DESCRIPTION - MTYNIA104M

CHART NO. 38
 NO. OF SAMPLES TESTED - 19



Cornell-Dubilier
MTYKNIC 683M
Capacitor

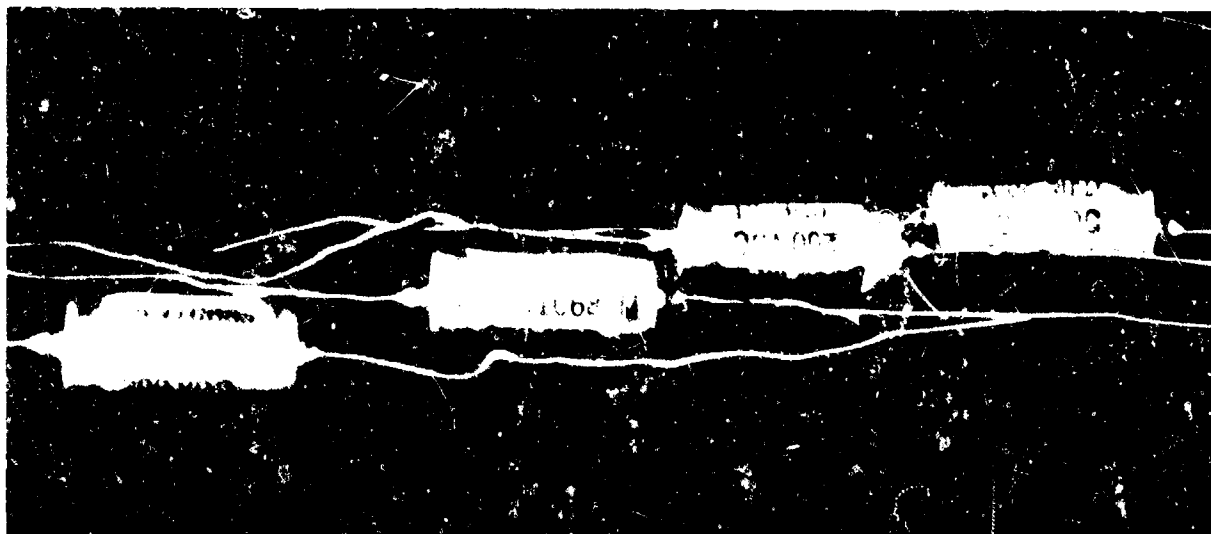
0.068 μ F $\pm$ 20%
200 VDCW

Metalized paper, film
Tubular, axial lead
Glass end seal
1.125 x 0.5" diam

SOAK PERIOD: 16 hours at 10,000 psig.

MECHANICAL: Visual inspection following completion of tests showed slight deformation of the metal cases of all components. All damaged components remained functional throughout the entire test.

ELECTRICAL: All components indicated less than 10% change.



Cornell-Dubilier
MTYTNA104M
Capacitor

0.10 μ F $\pm$ 20%
200 VDCW

Metalized paper, film
Tubular, axial lead
Glass end seal
0.875 x 0.312" diam

SOAK PERIOD: None

MECHANICAL: Visual inspection following completion of tests showed deformation of metal cases of all components. Seventeen of the damaged components remained functional throughout the entire test.

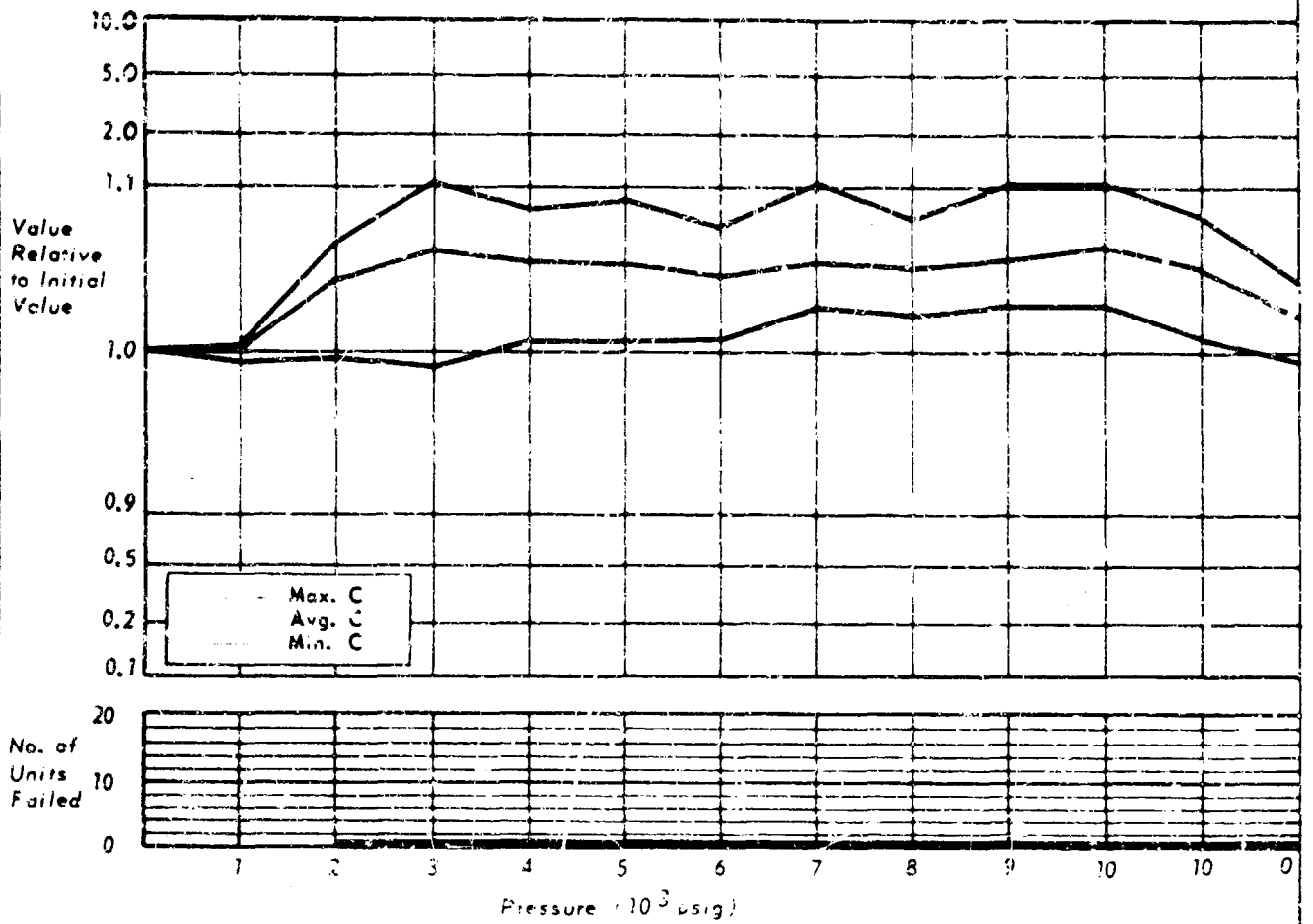
ELECTRICAL: Seventeen components indicated less than 10% change.

Two components indicated a change greater than 50% with subsequent recovery at pressures shown on failure graph on opposite page.



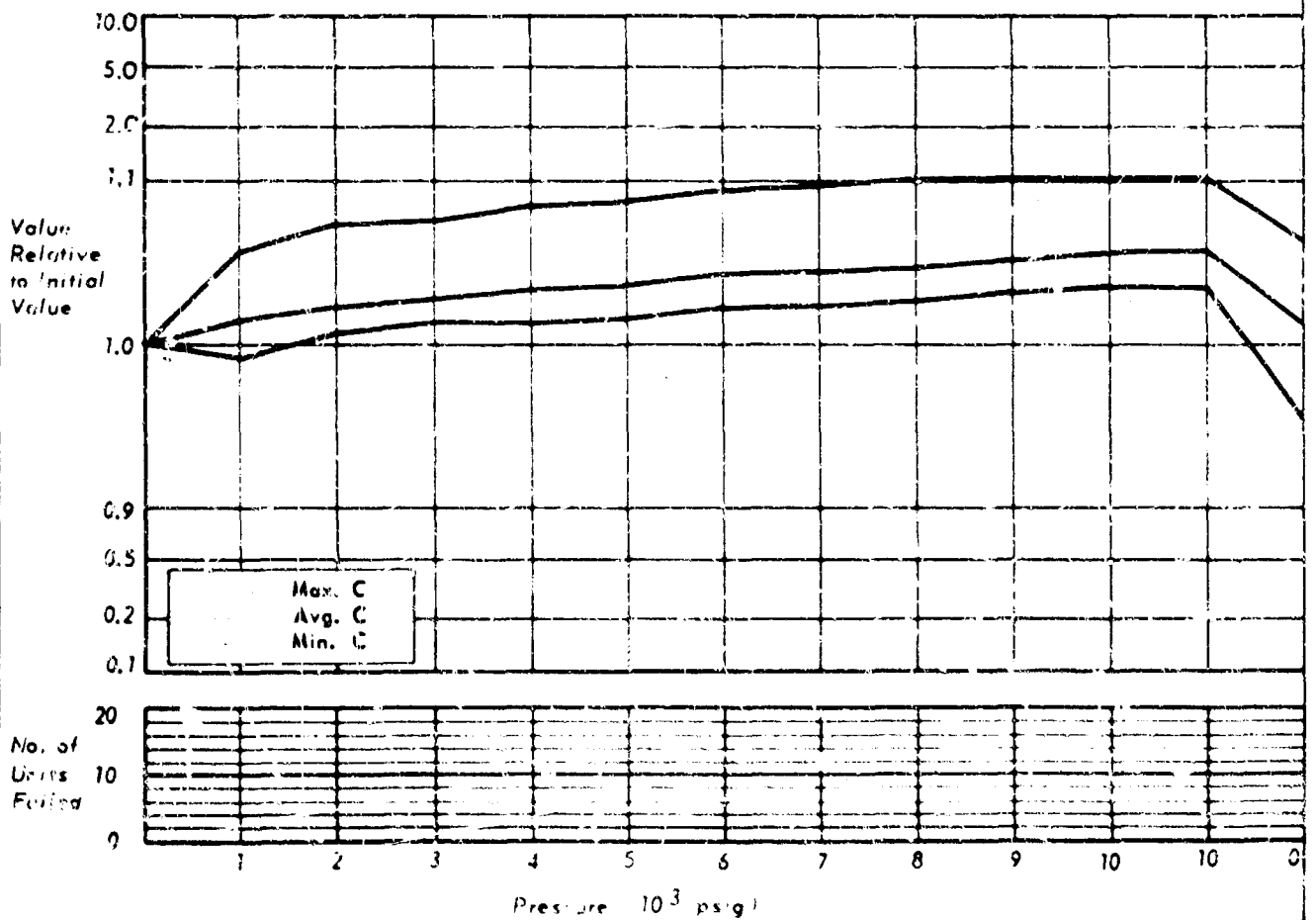
MFG. - CORNELL-DUBILIER
 TYPE - CAPACITOR
 DESCRIPTION - MTWKNIC104M

CHART NO. 39
 NO. OF SAMPLES TESTED - 18



MFG. - CORNELL-DUBILIER
 TYPE - CAPACITOR
 DESCRIPTION - CP05A1K0224K3

CHART NO. 40
 NO. OF SAMPLES TESTED - 19



Cornell-Dubilier
MTWKNIC194M
Capacitor

0.10 μ F $\pm$ 20%
200 VDCW

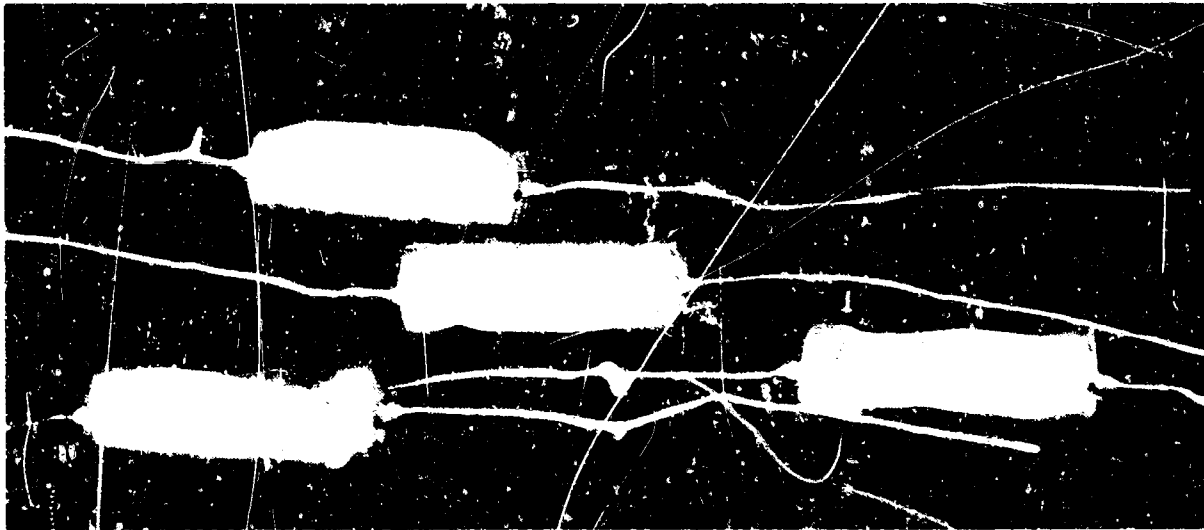
Metalized paper, film
Tubular, axial lead
Glass end seal
0.87 x 0.312" diam

SOAK PERIOD: None

MECHANICAL: Visual inspection following completion of tests showed deformation of the metal cases of all components. Eighteen of the damaged components remained functional throughout the entire test.

ELECTRICAL: Eighteen components indicated less than 10% change.

FAILURES: One component indicated a permanent change greater than 50% at the pressures shown on the failure graph on opposite page.



Cornell-Dubilier
CP05A1KB22413
Capacitor

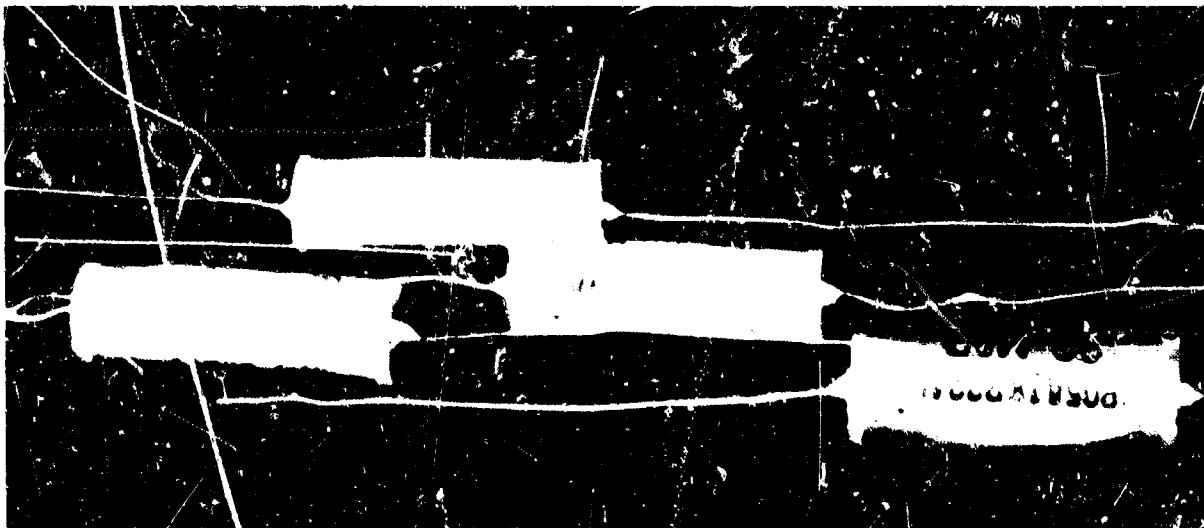
0.22 μ F
100 VDCW

Paper, oil
Tubular, axial lead
Metal case
1.125 x 0.4" diam

SOAK PERIOD: None

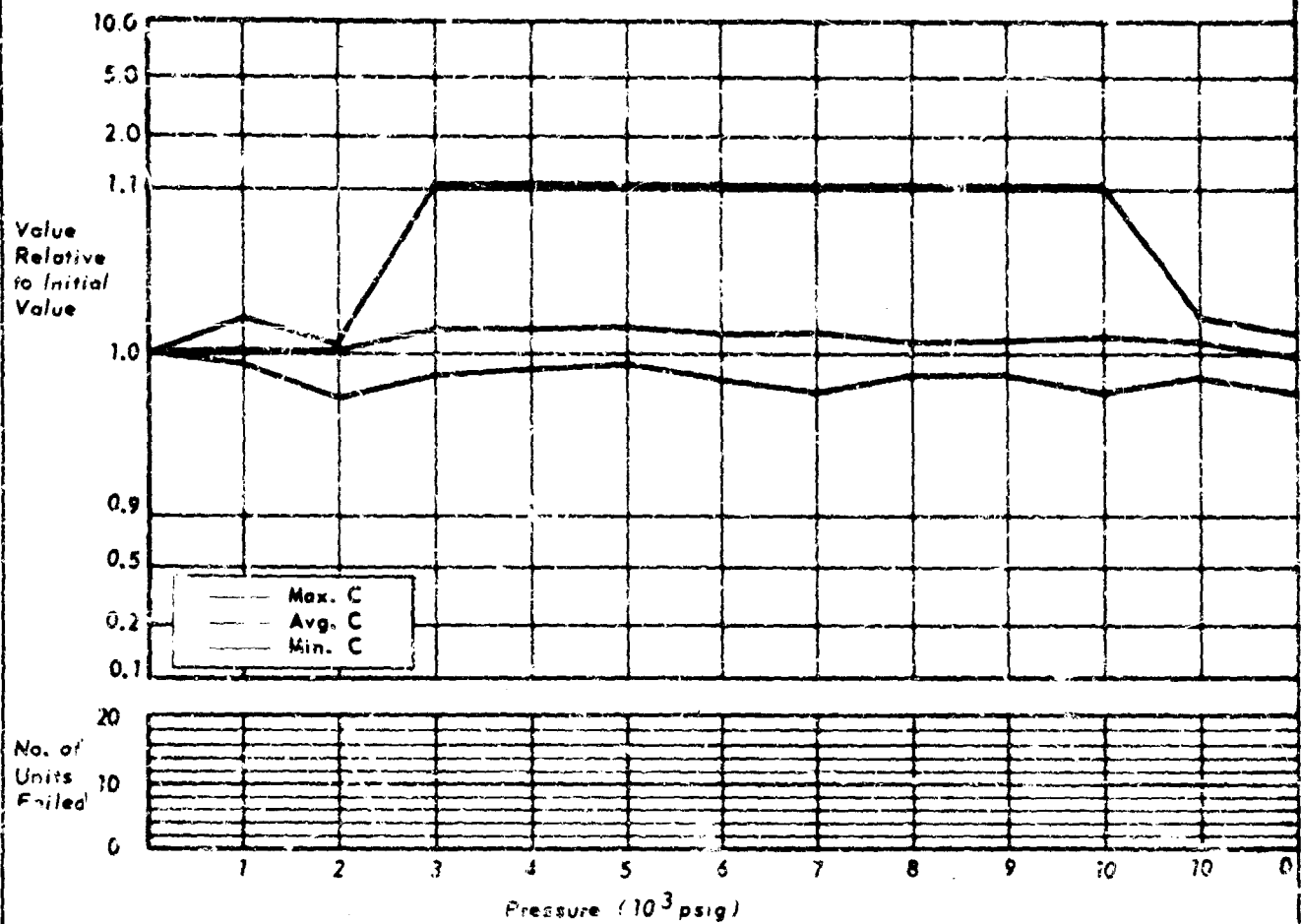
MECHANICAL: Visual inspection following completion of tests showed deformation of the metal cases of all components. All damaged components remained functional throughout the entire test.

ELECTRICAL: All components indicated less than 10% change.



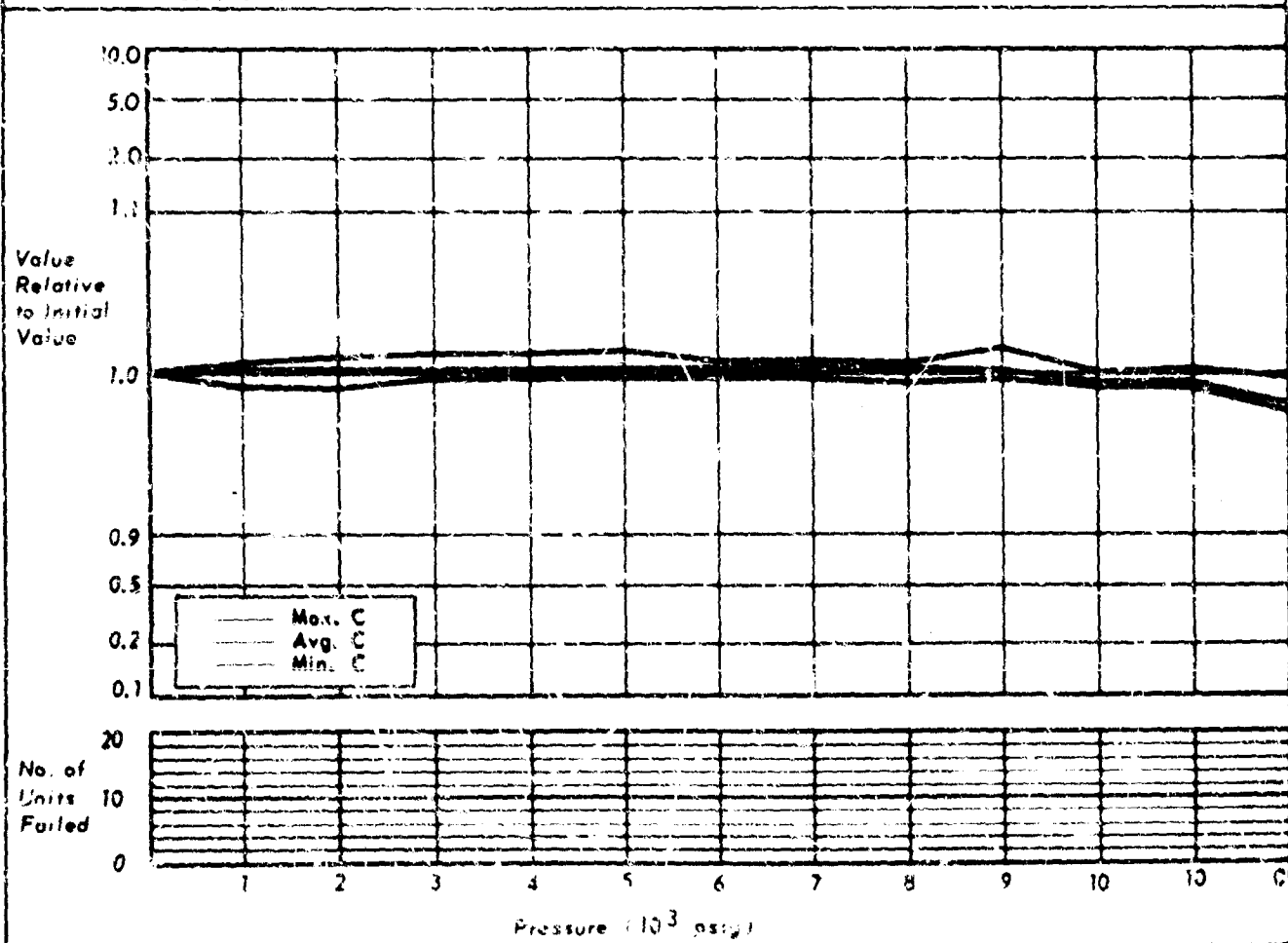
MFG.-CORRELL-DUBILIER
 TYPE-CAPACITOR
 DESCRIPTION-TYR128F82K

CHART NO. 41
 NO. OF SAMPLES TESTED-20



MFG.-CORRELL-DUBILIER
 TYPE-CAPACITOR
 DESCRIPTION-CD18F391J

CHART NO. 42
 NO. OF SAMPLES TESTED-20



Cornell-Dubilier

0.82 μ F

Solid tantalum

TYR12BF82K

35 VDCW

Tubular, axial lead

Capacitor

0.438 x 0.175" diam.

SOAK PERIOD: None

MECHANICAL: No apparent damage

ELECTRICAL: All components indicated less than 10% change.

Cornell-Dubilier

390 pF $\pm$ 5%

Mica, dipped

CD15F391J

500 VDCW

Rectangular

Capacitor

Radial lead

0.47 x 0.4 x 0.22" th.

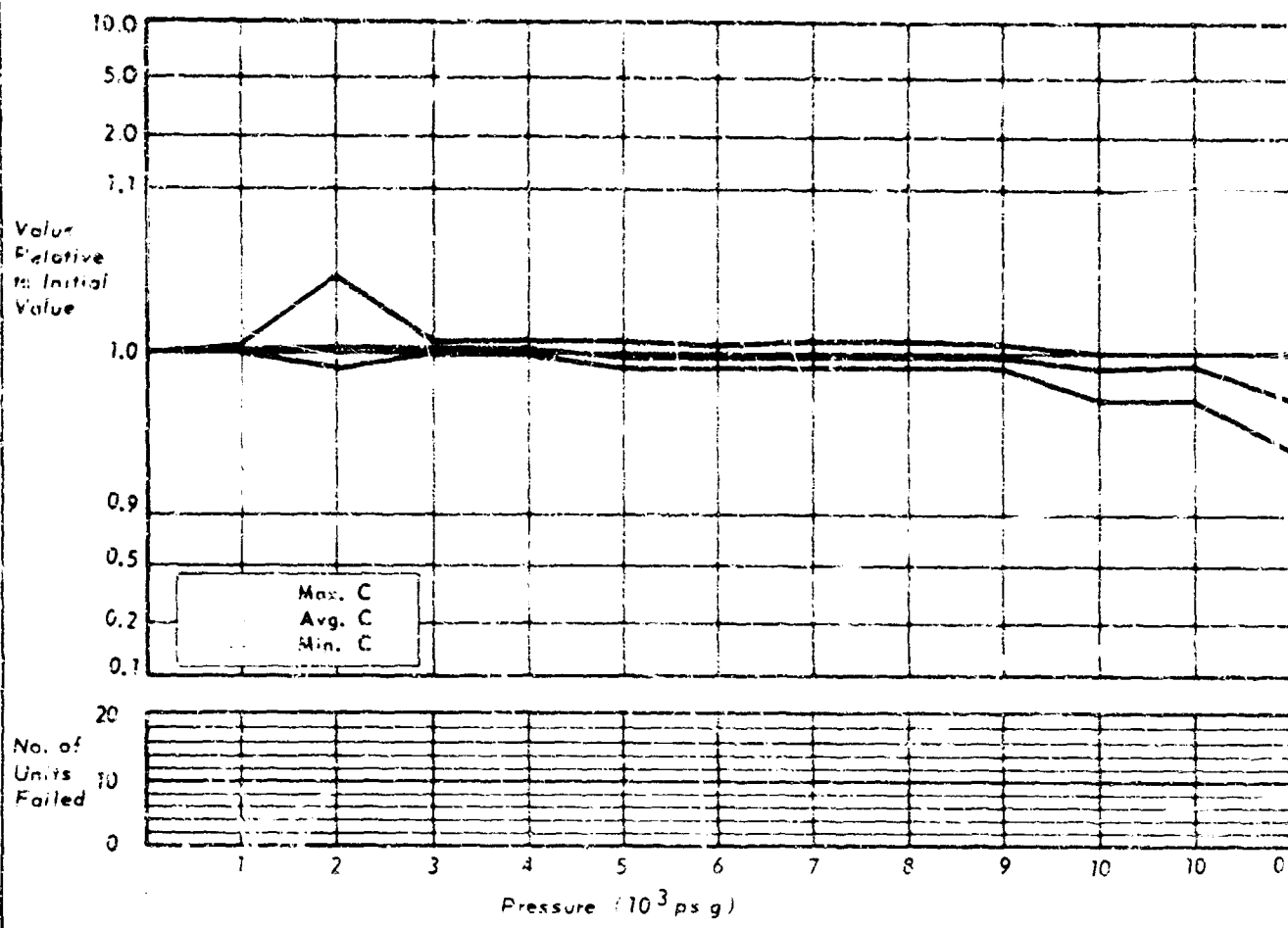
SOAK PERIOD: 15.5 hours at 10,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

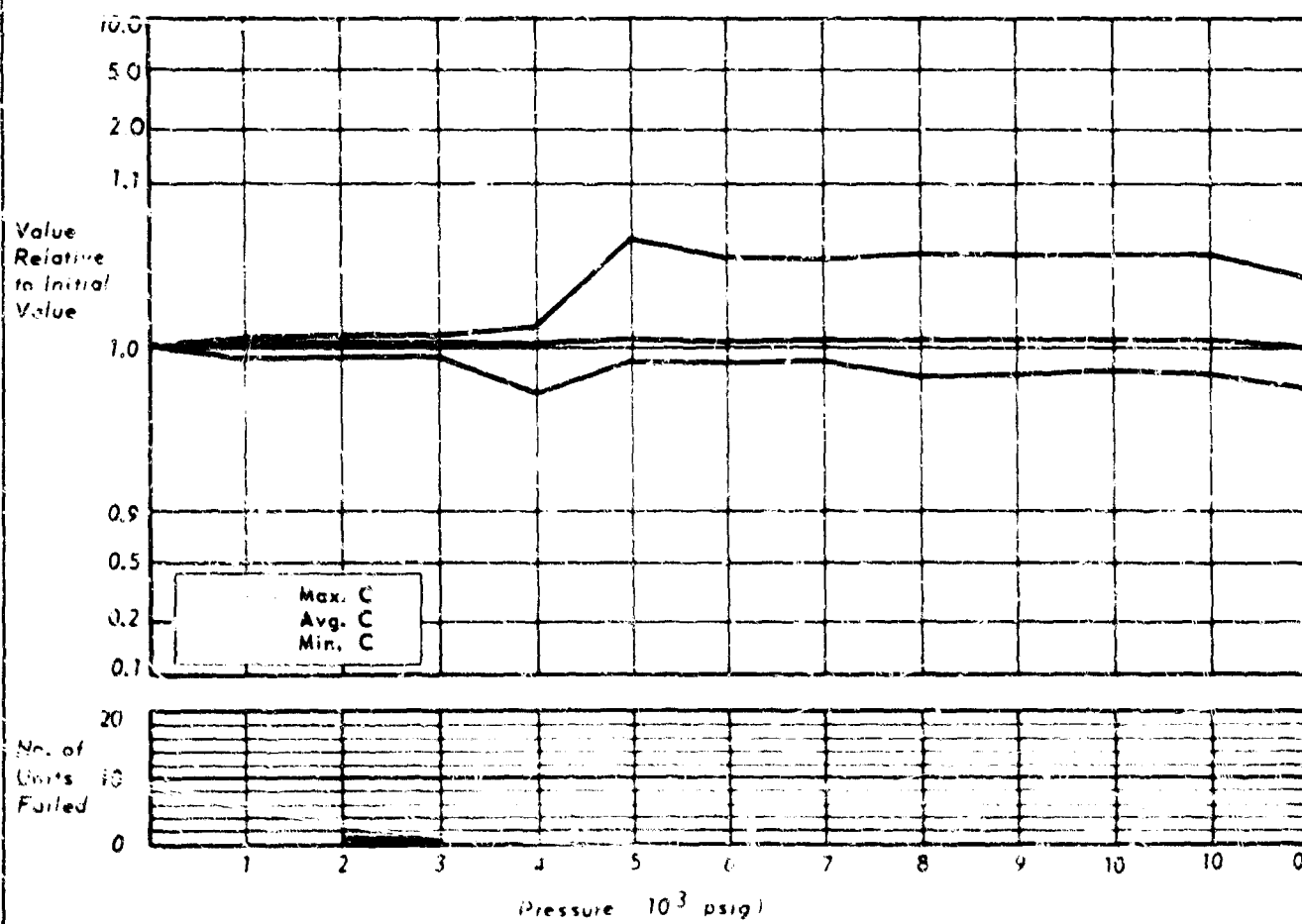
MFG. - CORNELL-DUBILIER
 TYPE - CAPACITOR
 DESCRIPTION - 2030F103J

CHART NO. 43
 NO. OF SAMPLES TESTED - 19



MFG. - CORNELL DUBILIER
 TYPE - CAPACITOR
 DESCRIPTION - HCC3224P

CHART NO. 44
 NO. OF SAMPLES TESTED - 20



Cornell-Dubilier
CD30F103J
Capacitor

0.01 μ F $\pm$ 5%
500 VDCW

Mica, dipped
Rectangular
Radial lead
0.8 x 0.89 x 0.34" th.

SOAK PERIOD: 16 hours at 10 000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

Cornell-Dubilier
HCC3224P
Capacitor

0.22 μ F
3 VDCW

Ceramic, tear drop
Phenolic coated
Wax impreg.

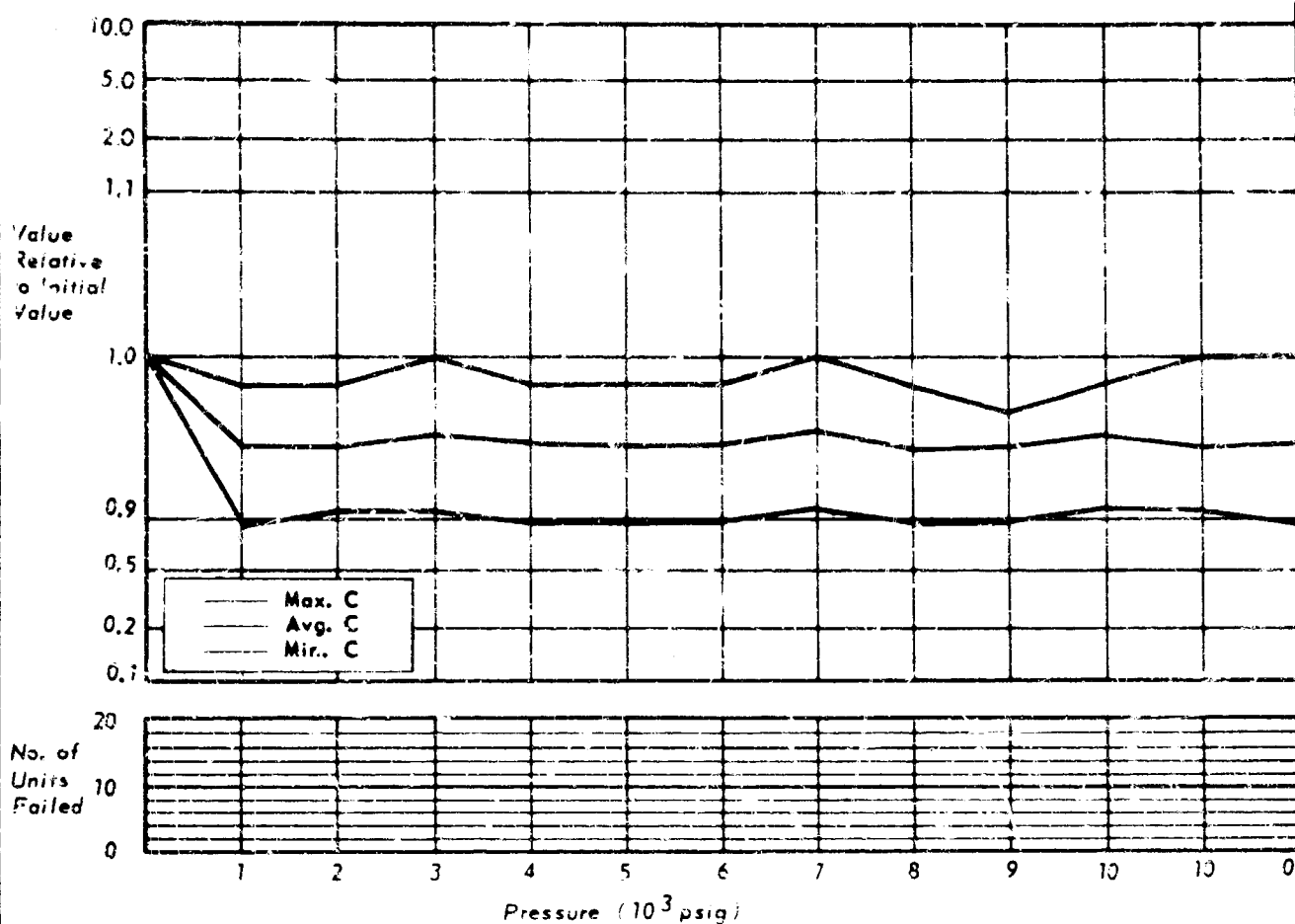
SOAK PERIOD: 14 hours at 8,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

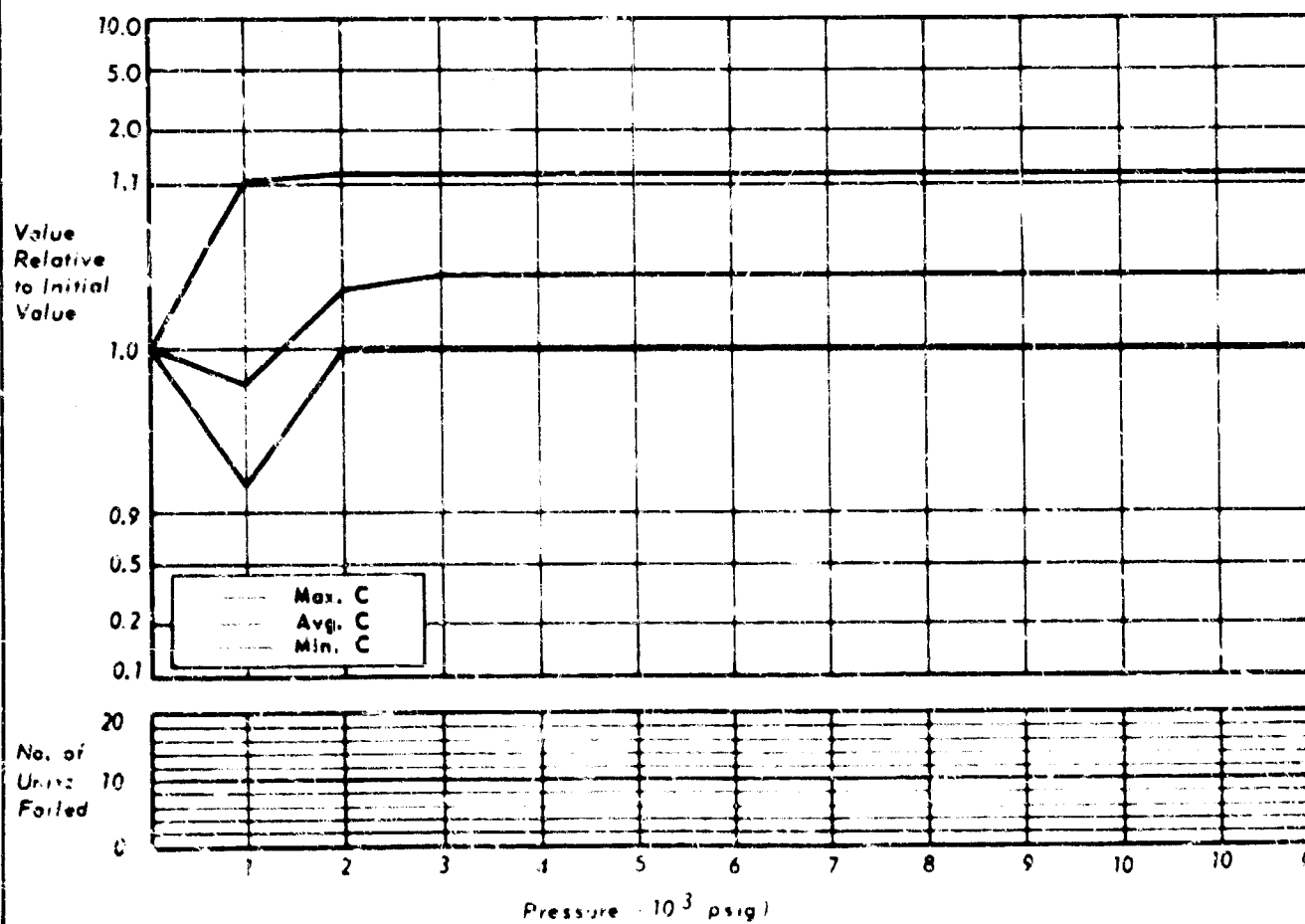
MFG.-CORNING
TYPE-CAPACITOR
DESCRIPTION-CYFM10

CHART NO. 45
NO. OF SAMPLES TESTED-20



MFG.-CORNING
TYPE-CAPACITOR
DESCRIPTION-CYFM15

CHART NO. 46
NO. OF SAMPLES TESTED-19



Corning
CYMF 10
Capacitor
SOAK PERIOD: 16 hours at 10,000 psig.
MECHANICAL: No apparent damage.
ELECTRICAL: Nineteen components indicated less than 10% change.
One component indicated a change greater than 10% and less than 50%.

100 pF $\pm$ 10%
300 VDCW

Glass, foil
Rectangular, axial lead
0.406 x 0.203 x 0.78" th.

Corning
CYFM 15
Capacitor
SOAK PERIOD: 15.5 hours at 10,000 psig.
MECHANICAL: No apparent damage.
ELECTRICAL: Nineteen components indicated less than 10% change. One component indicated a change greater than 10% and less than 50%.

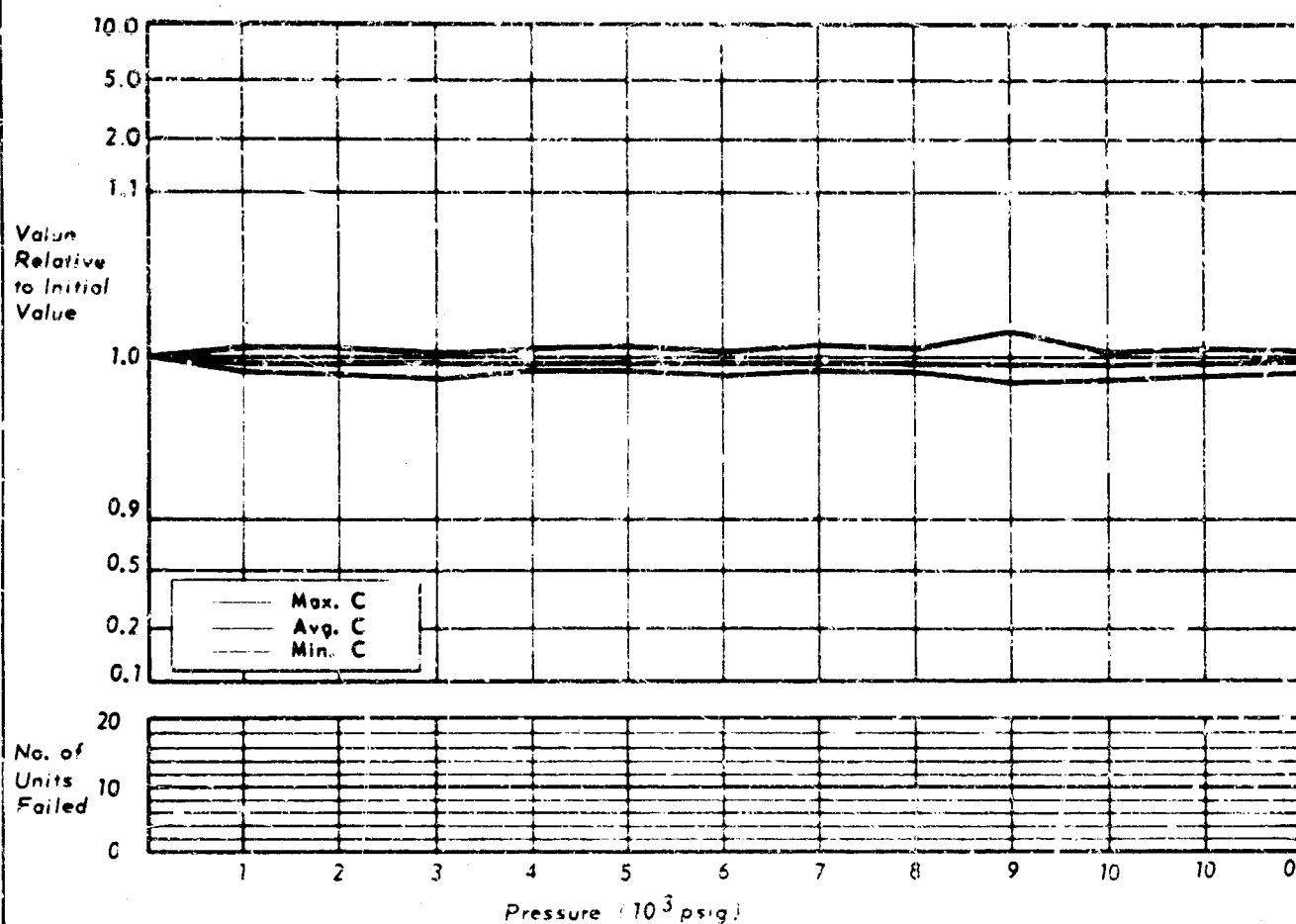
680 pF $\pm$ 5%
300 VDCW

Glass, foil
Rectangular, axial lead
0.468 x 0.265 x 0.11" th.

55

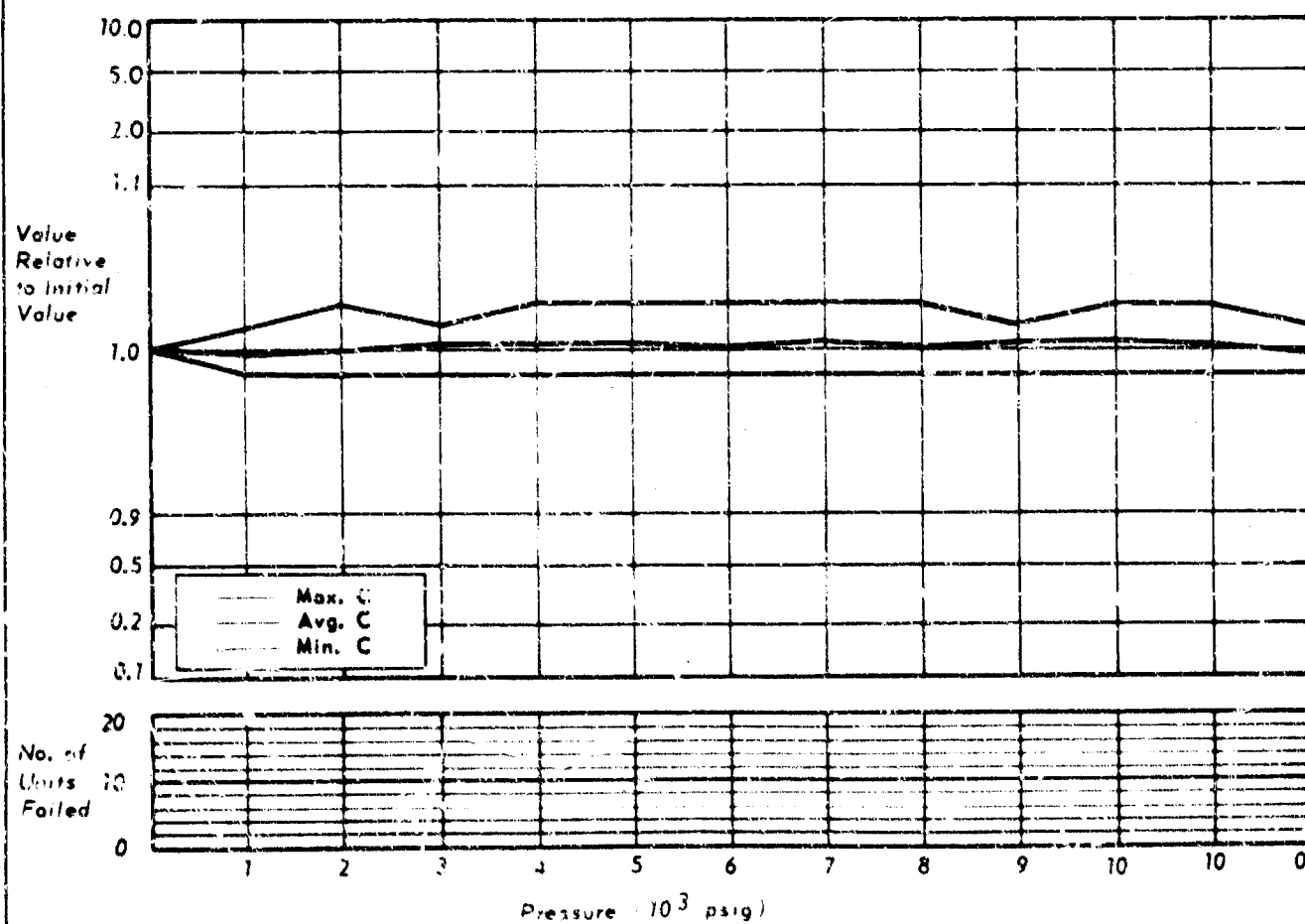
MFG. - CORNING
 TYPE - CAPACITOR
 DESCRIPTION - CYFM20

CHART NO. 47
 NO. OF SAMPLES TESTED - 20



MFG. - CORNING
 TYPE - CAPACITOR
 DESCRIPTION - CYTM30

CHART NO. 48
 NO. OF SAMPLES TESTED - 20



Corning
CYFM 20
Capacitor
SOAK PERIOD: 16 hours at 3,000 psia.
MECHANICAL: No apparent damage.
ELECTRICAL: All components indicated less than 10% change.

4700 pF $\pm$ 5%
300 VDCW

Glass, foil
Rectangular, axial lead
0.468 x 0.235 x 0.11" th.

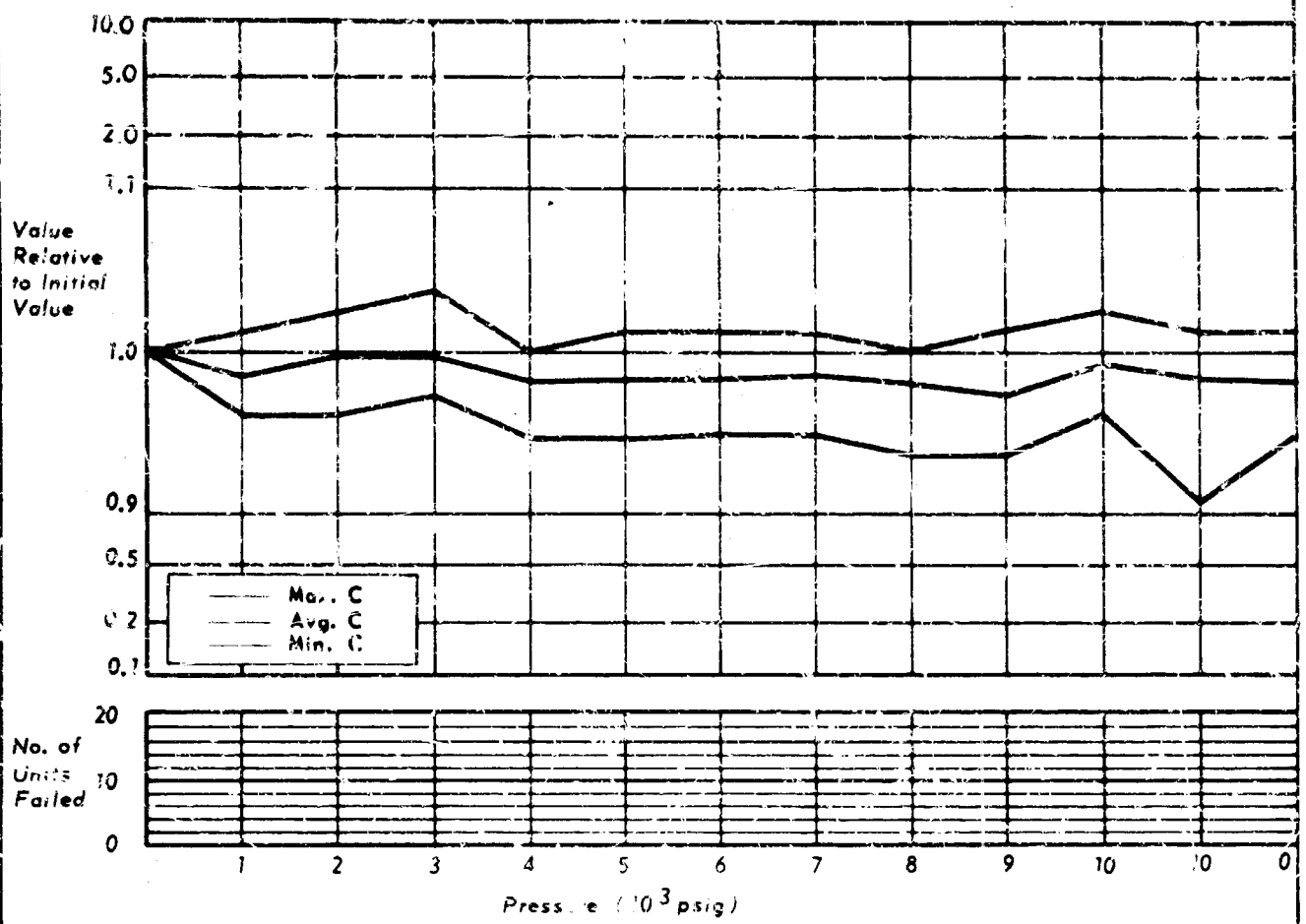
Corning
CYFM 30
Capacitor
SOAK PERIOD: 15.5 hours at 10,000 psig.
MECHANICAL: No apparent damage.
ELECTRICAL: All components indicated less than 10% change.

6800 pF $\pm$ 5%
500 V

Glass, foil
Rectangular, axial lead
0.76 x 0.76 x 0.16" th.

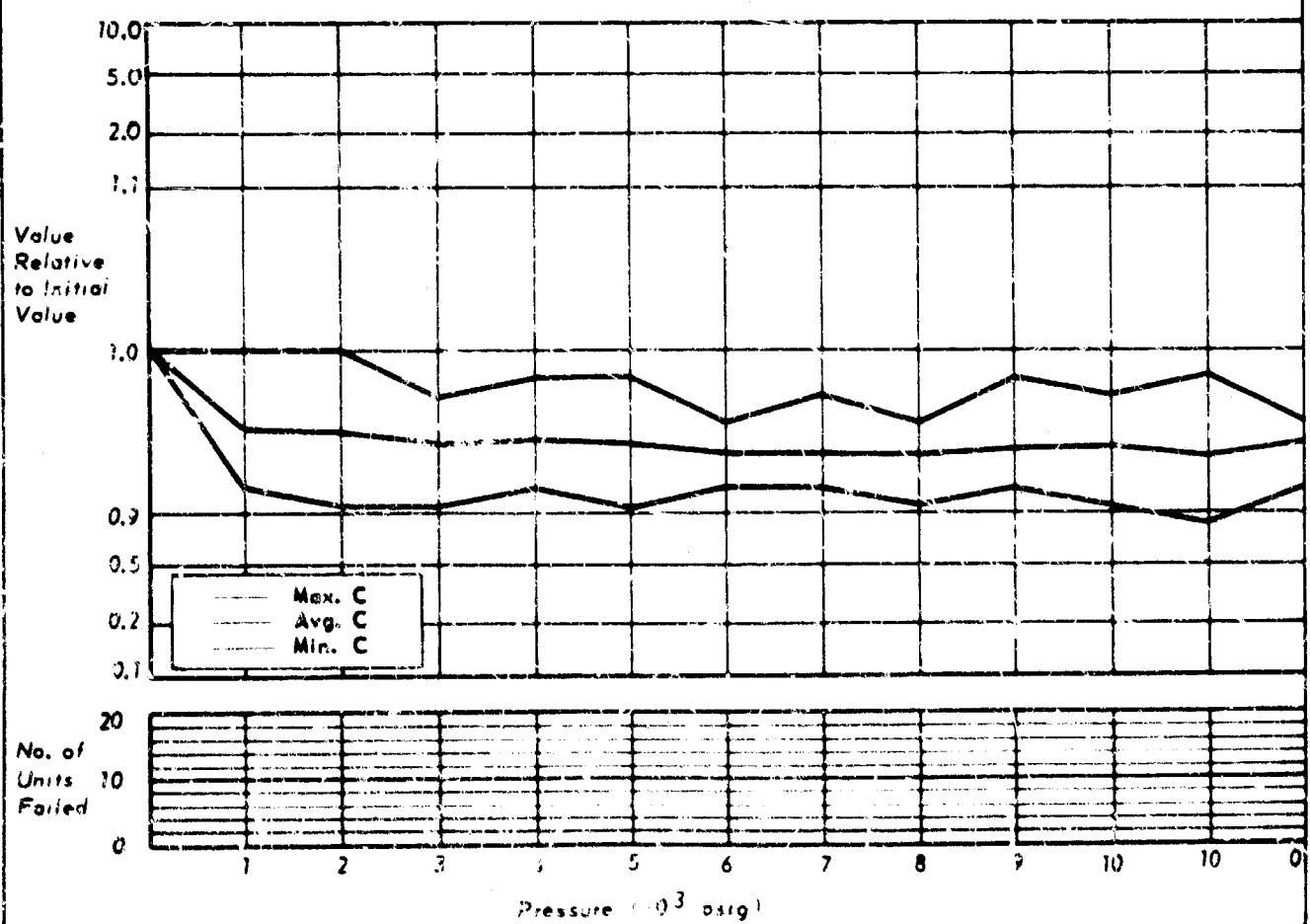
MFG. - CORNING
 TYPE - CAPACITOR
 DESCRIPTION - TY06

CHART NO. 49
 NO. OF SAMPLES TESTED - 2



MFG. - CORNING
 TYPE - CAPACITOR
 DESCRIPTION - TY07

CHART NO. 50
 NO. OF SAMPLES TESTED - 19



Corning
TY 06
Capacitor

300 pF $\pm 2\%$
300 VDCW

Glass, foil
Rectangular, radial lead
Molded case
0.3 x 0.2 x 0.115" th.

SOAK PERIOD: 16 hours at 3,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

Corning
TY07
Capacitor

680 pF $\pm 5\%$
300 VDCW

Glass, foil
Rectangular, radial lead
molded case
0.3 x 0.3 x 0.11" th.

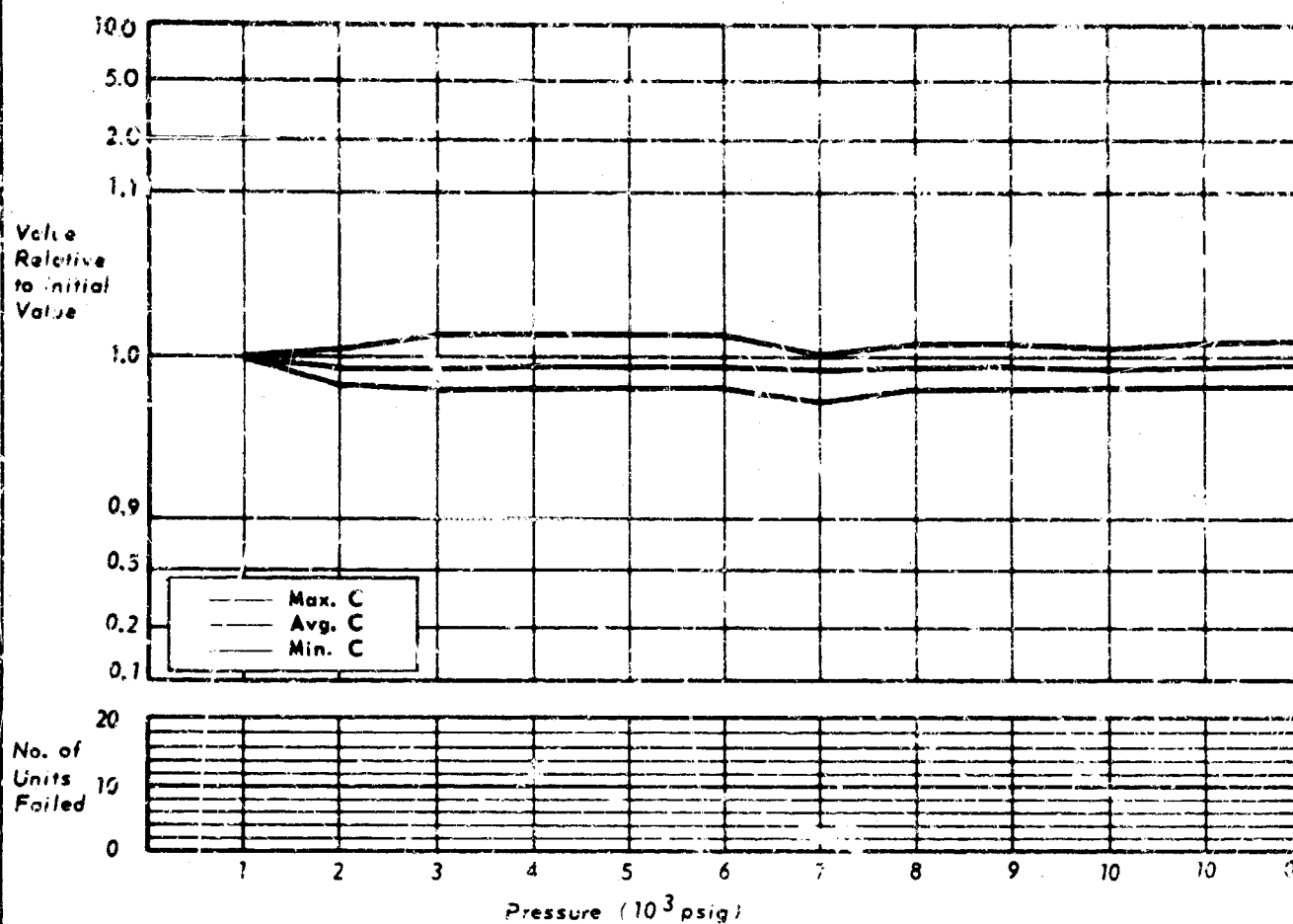
SOAK PERIOD: 16 hours at 3,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

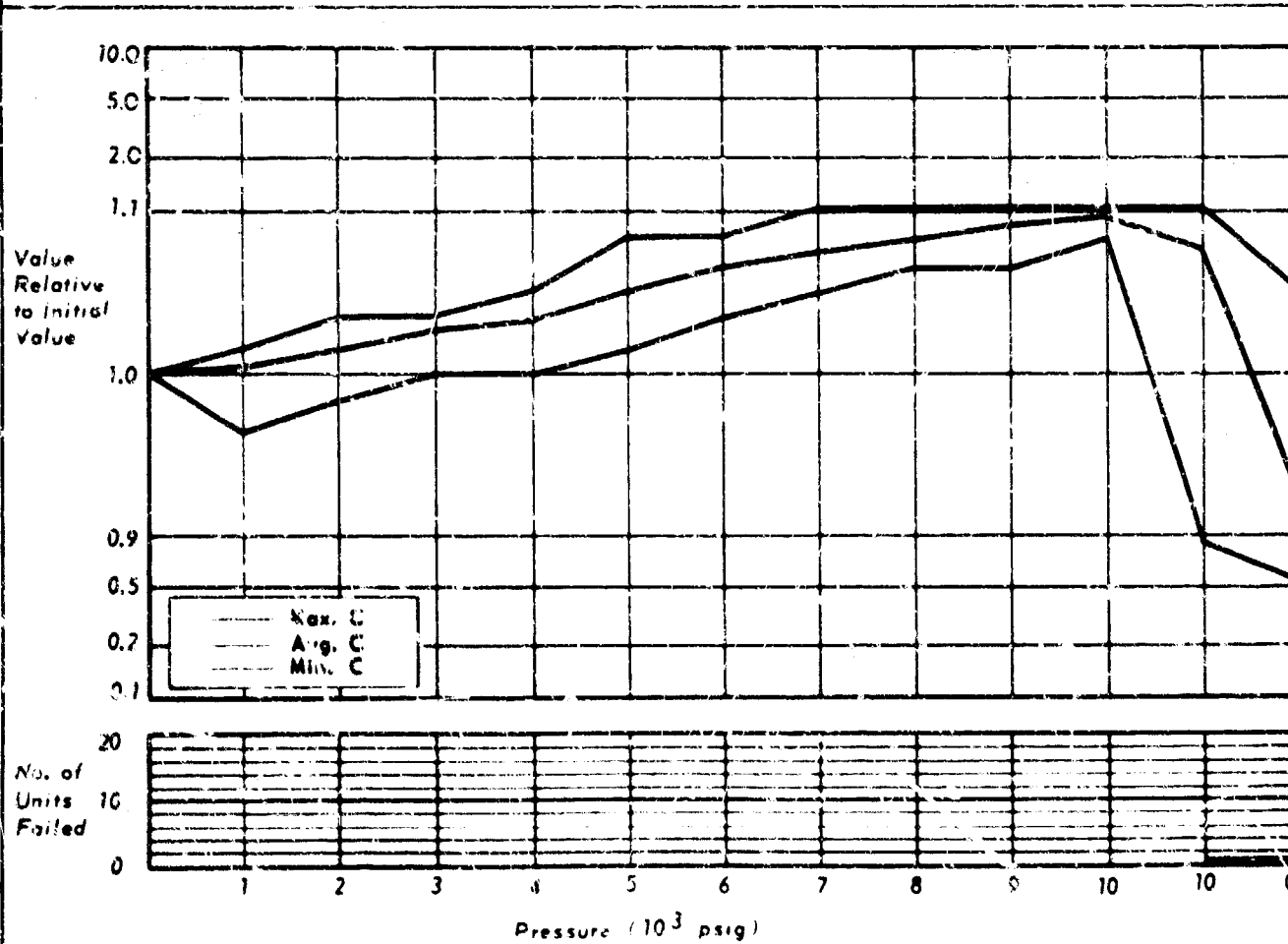
MFG. - CORNING
 TYPE - CAPACITOR
 DESCRIPTION - YY38

CHART NO. 51
 NO. OF SAMPLES TESTED - 20



MFG. - POTTER
 TYPE - CAPACITOR
 DESCRIPTION - 2002-8214

CHART NO. 52
 NO. OF SAMPLES TESTED - 19



Corning
TY68
Capacitor

2000 pF $\pm 1\%$
300 VDCW

Glass, flat
Rectangular, radial lead
Molded case
0.5 x 0.3 x 0.115" th.

SOAK PERIOD: 15.5 hours at 10,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

Potter
2002-621J
Capacitor

620 pF $\pm 5\%$
200 VDCW

Ceramic, disc
Tubular, axial lead
0.25 x 0.1" diam.

SOAK PERIOD: None

MECHANICAL: No apparent damage.

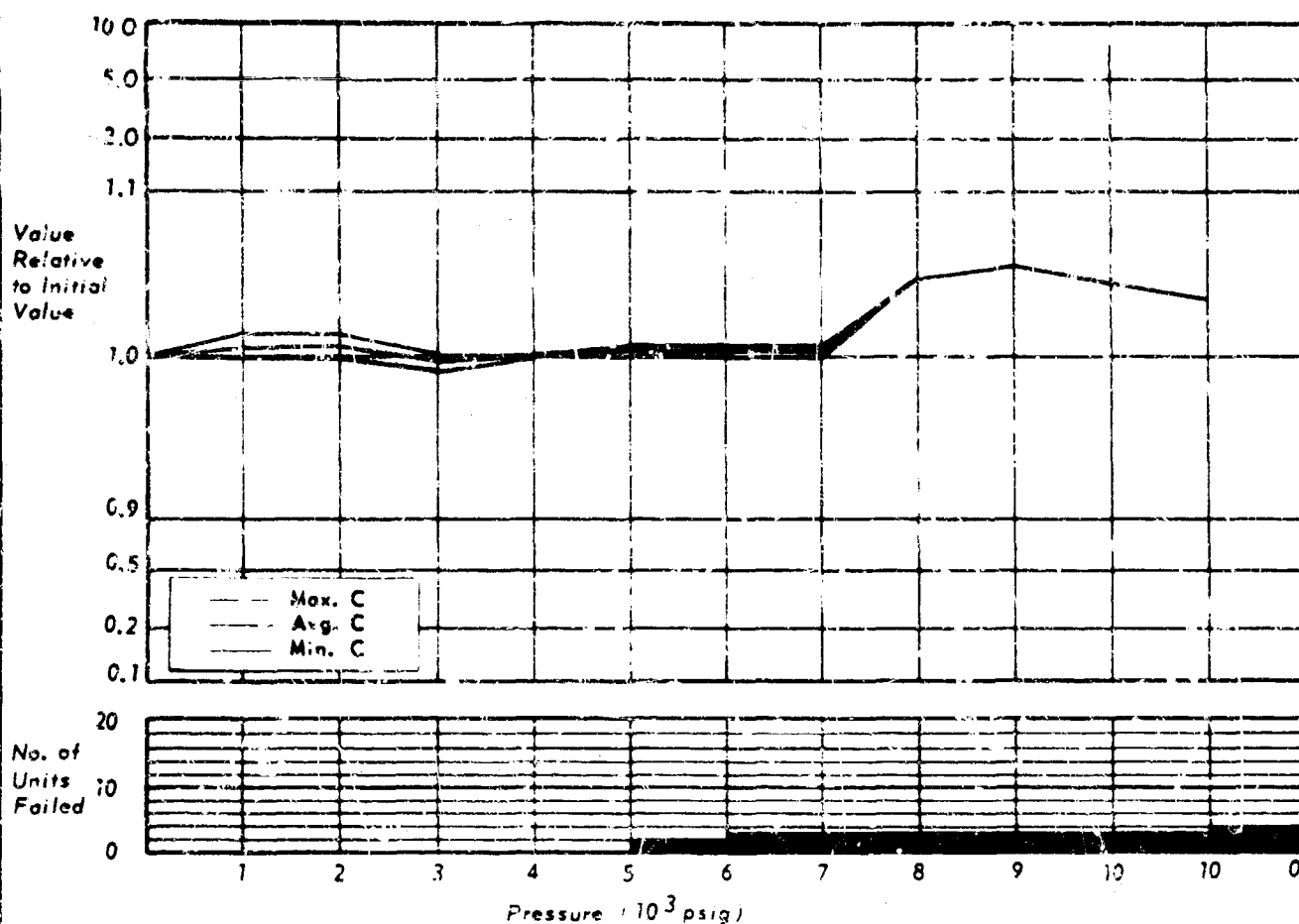
ELECTRICAL: Twelve components indicated less than 10% change.

Six components indicated a change greater than 10% and less than 50%.

FAILURES: One component indicated a permanent change greater than 50% at the pressures shown on the failure graph on opposite page.

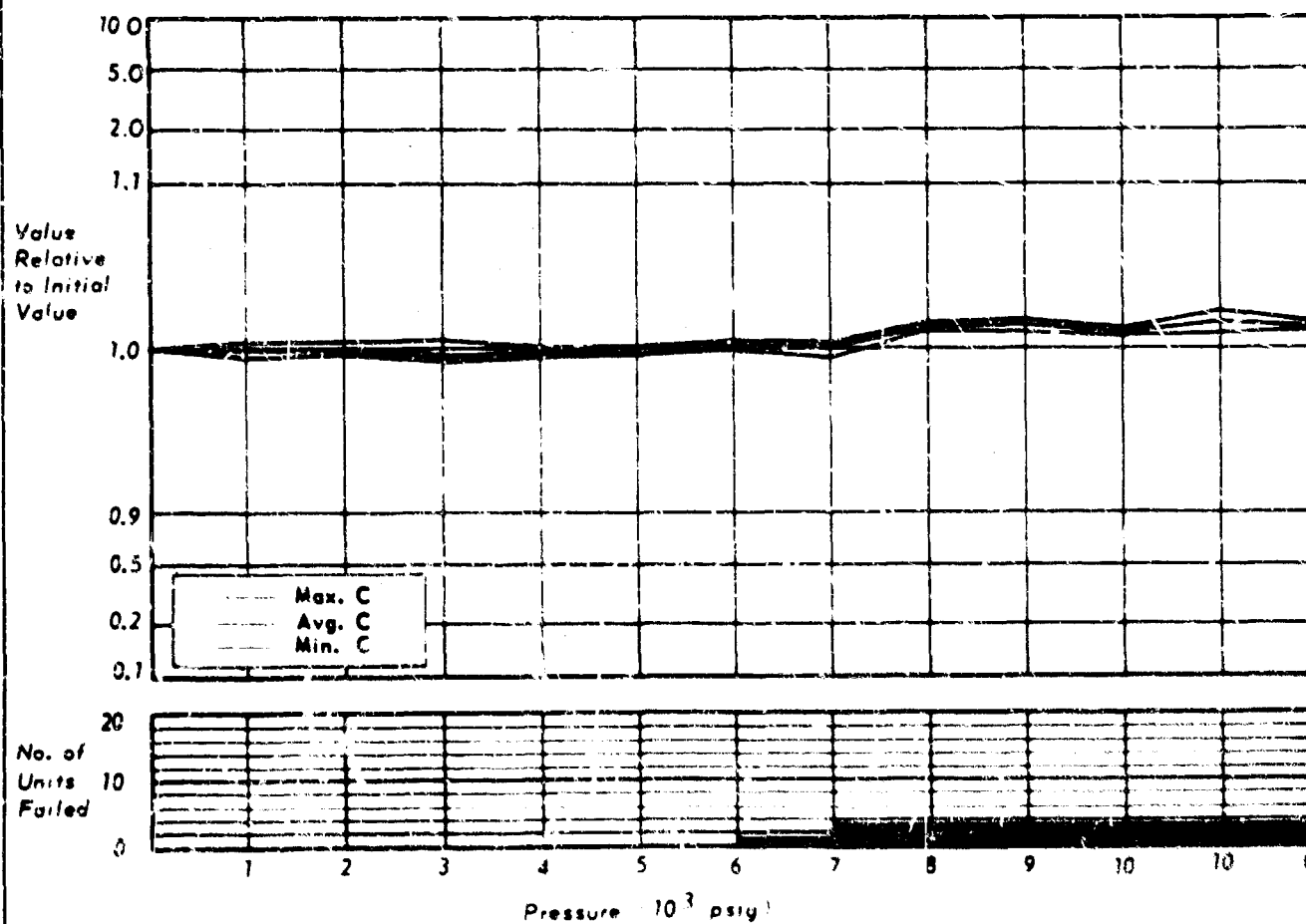
MFG. - TEXAS INSTRUMENTS
 TYPE - CAPACITOR
 DESCRIPTION - SCM155B7035A2

CHART NO. 53
 NO. OF SAMPLES TESTED - 4



MFG. - TEXAS INSTRUMENTS
 TYPE - CAPACITOR
 DESCRIPTION - SCMB258P020A2

CHART NO. 54
 NO. OF SAMPLES TESTED - 5



Texas Instruments
SCM 155BP035A
Capacitor

1.5 μ F
35 VDCW

Electrolytic
Tantalum, solid
Tubular, axial lead
0.438 x 0.175" diam.

SOAK PERIOD: 16 hours at 3,000 psig.

MECHANICAL: Visual inspection after completion of test showed end seals broken on three components.

ELECTRICAL: One component indicated less than 10% change.

FAILURES: Four components indicated a permanent change greater than 50% at the pressures shown on the failure graph on opposite page.



Texas Instruments
SCM 825BP020A2
Capacitor

8.2 μ F
200 VDCW

Electrolytic
Tantalum, solid
Tubular, axial lead
0.438 x 0.175" diam.

SOAK PERIOD: 16 hours at 3,000 psig.

MECHANICAL: Visual inspection after completion of test showed deformation of the metal casing on three components and displacement of two end seals.

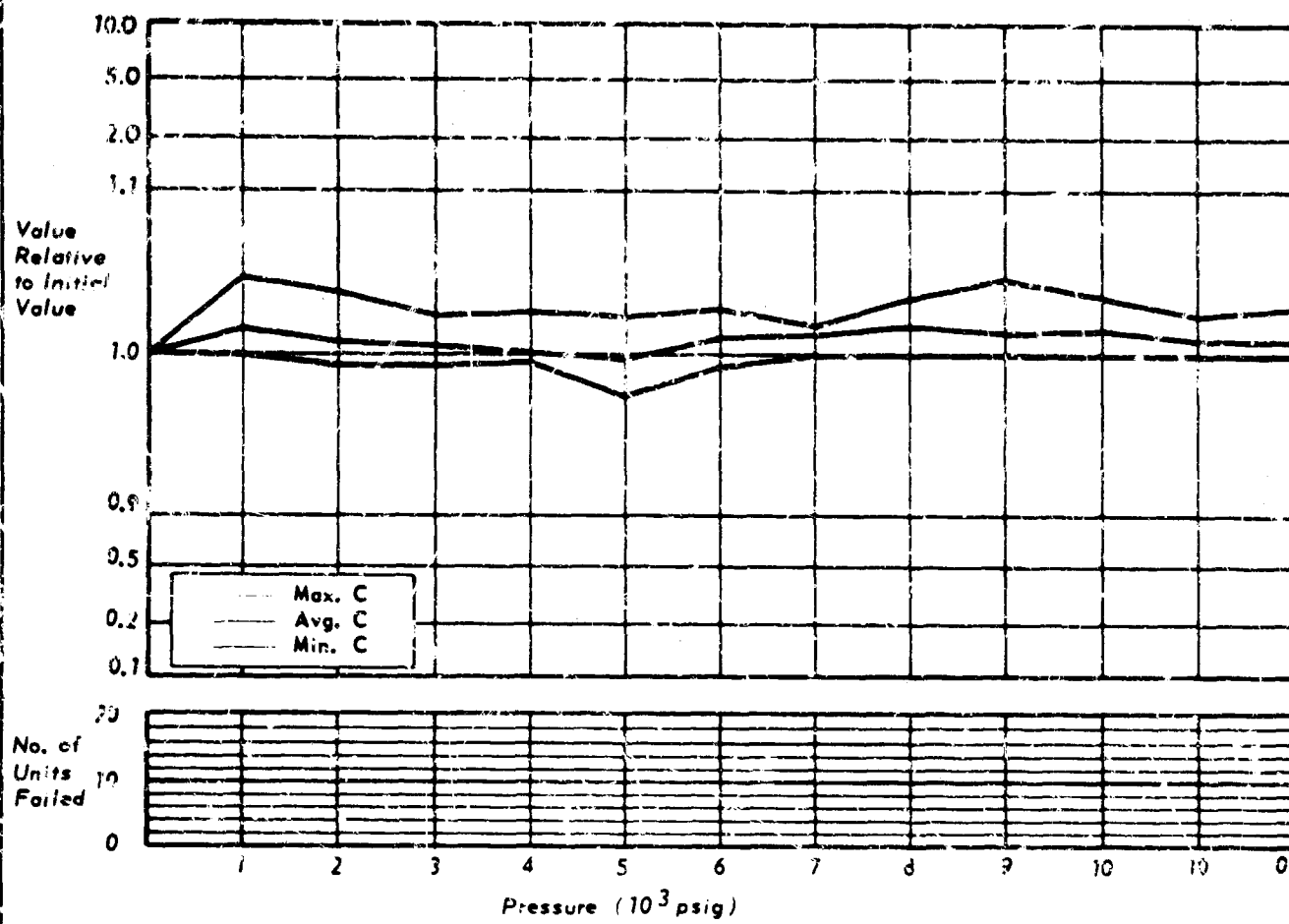
ELECTRICAL: Two components indicated less than 10% change.

FAILURES: Three components indicated a permanent change greater than 50% at the pressures shown on the failure graph on opposite page.



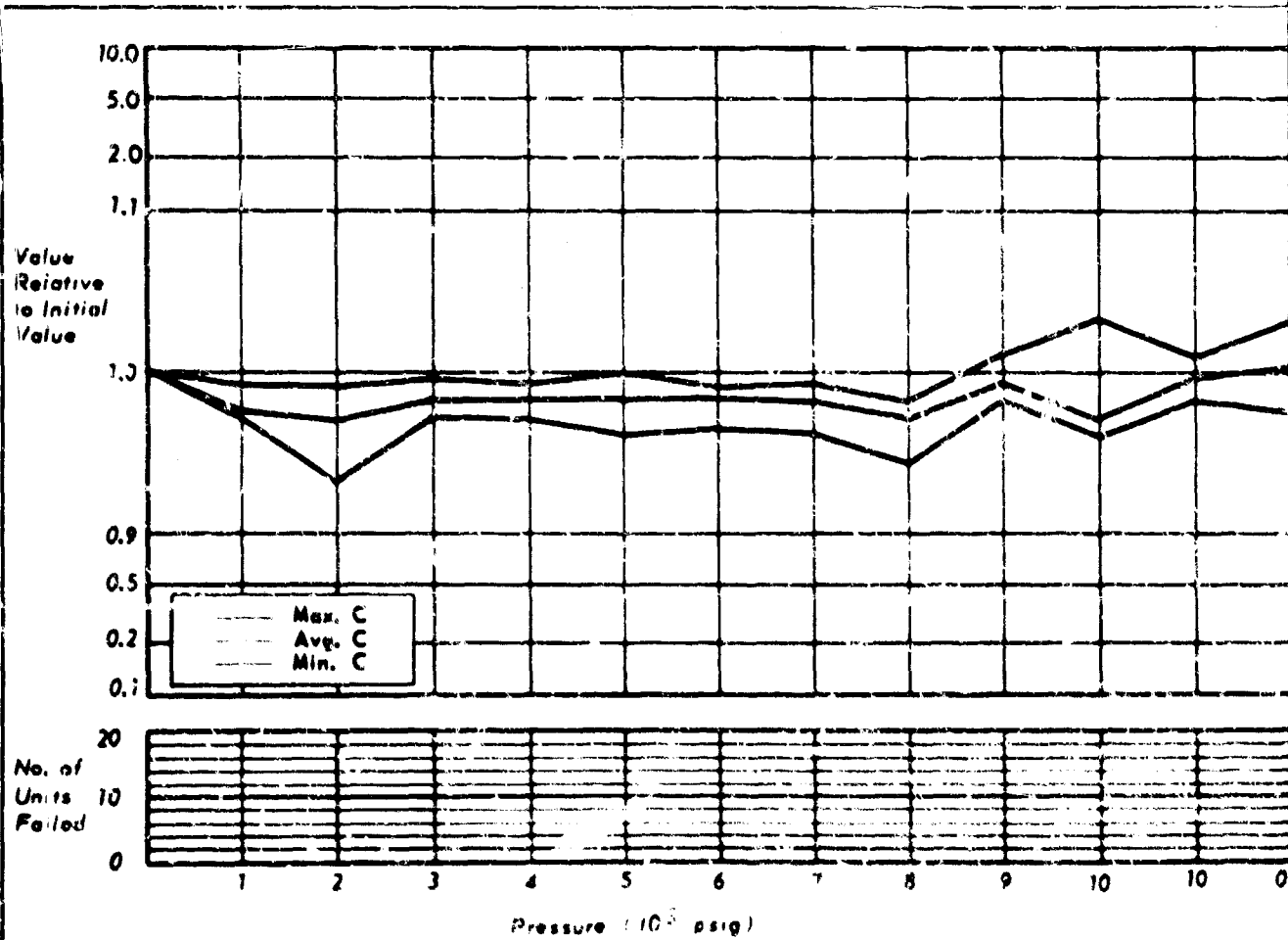
MFG. - TEXAS INSTRUMENTS
 TYPE - CAPACITOR
 DESCRIPTION - SCMP268P010A2

CHART NO. 55
 NO. OF SAMPLES TESTED - 5



MFG. - TEXAS INSTRUMENTS
 TYPE - CAPACITOR
 DESCRIPTION - SCMP268P010A2

CHART NO. 56
 NO. OF SAMPLES TESTED - 5



Texas Instruments
SCH226BP010A
Capacitor

22.0 μ F
15 VDCW

Electrolytic
Tantalum, solid
Tubular, axial lead
0.438 x 0.175" diam.

SOAK PERIOD: 16 hours at 3,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

Texas Instruments
SCH476BP006A2
Capacitor

47.0 μ F
5 VDCW

Electrolytic
Tantalum, solid
Tubular, axial lead
0.438 x 0.175" diam.

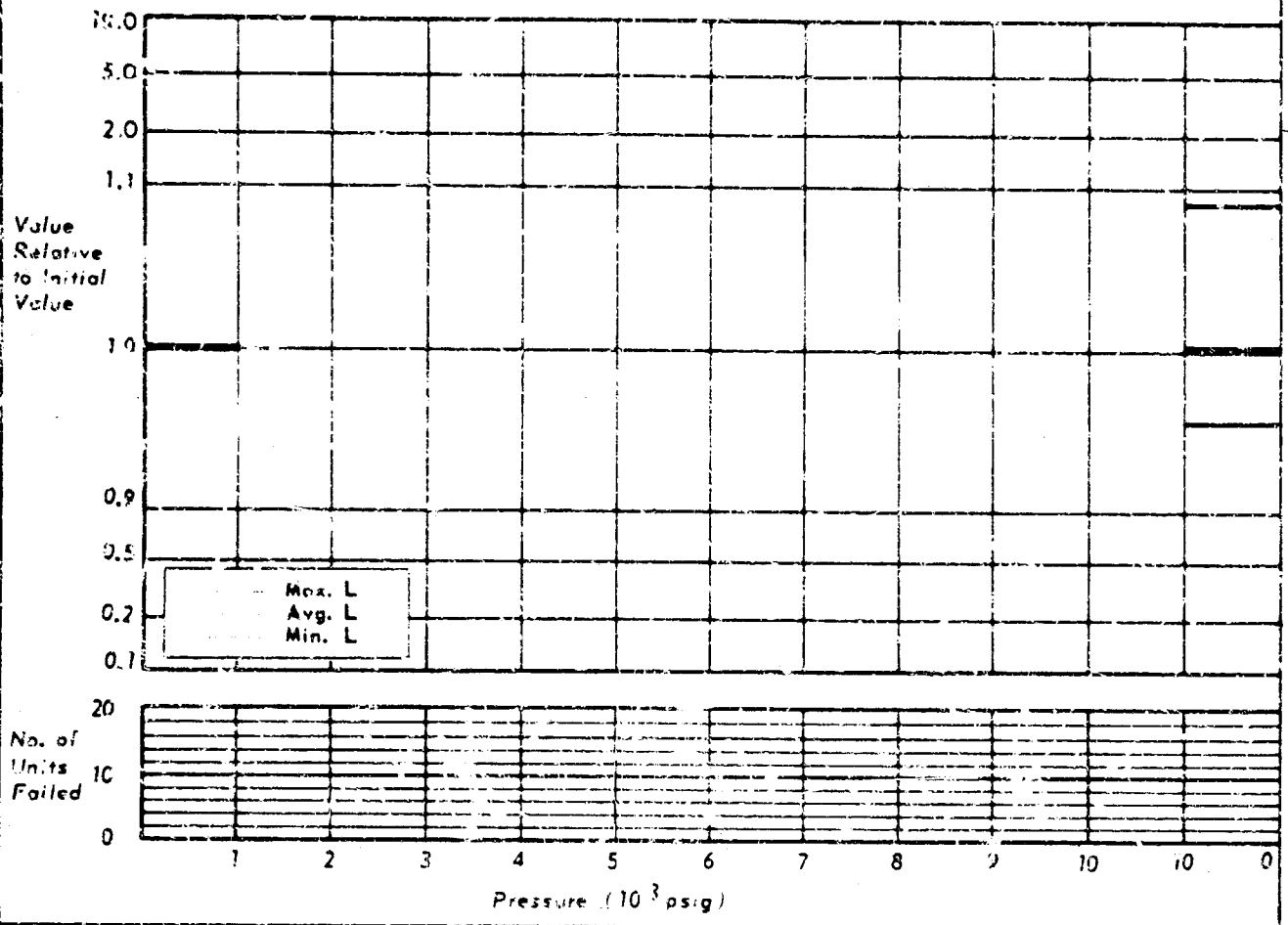
SOAK PERIOD: 16 hours at 3,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All Components indicated less than 10% change.

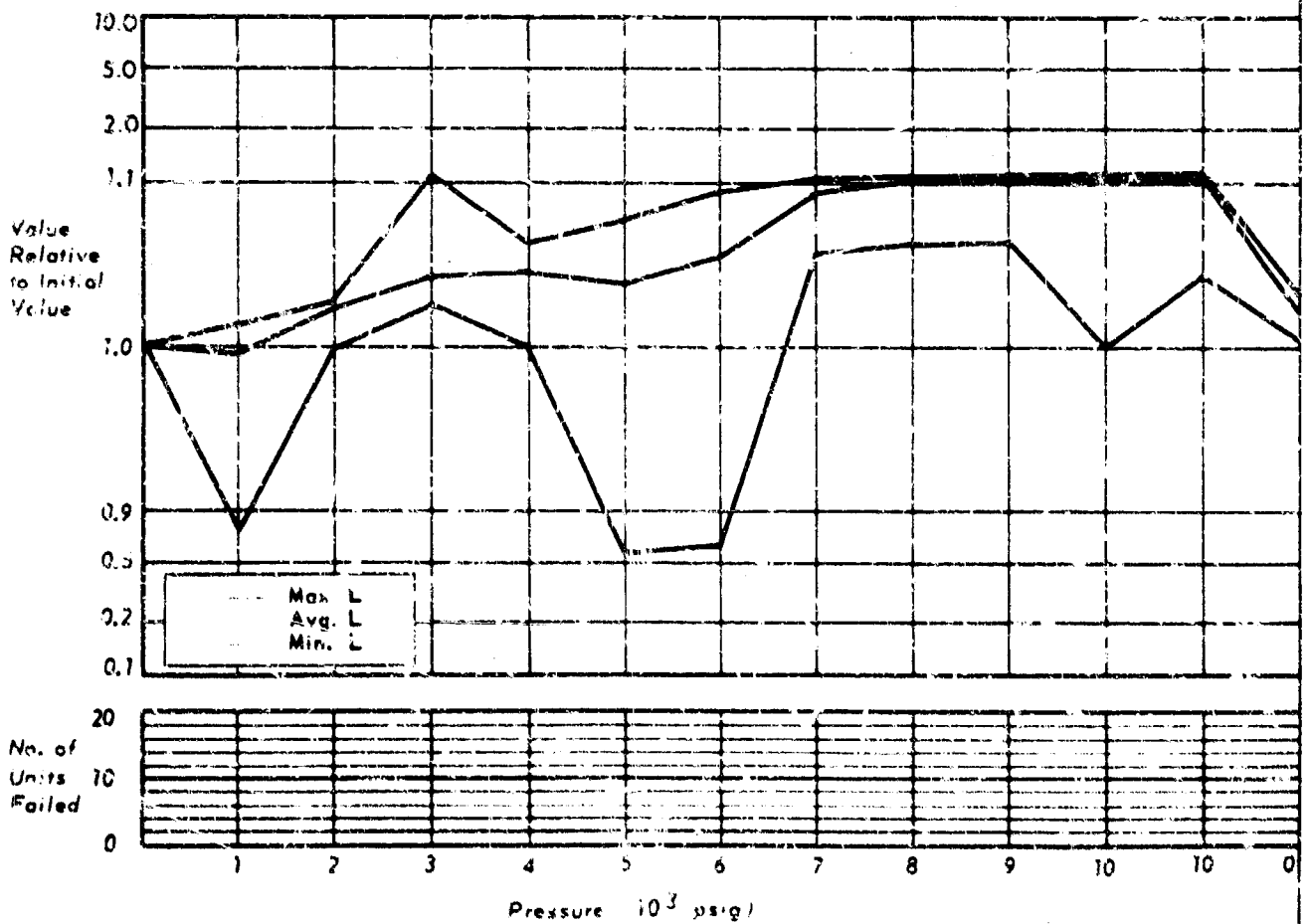
MFG.-GENERAL INSTRUMENTS
 TYPE-RF COIL
 DESCRIPTION-M975028-8

CHART NO. 57
 NO. OF SAMPLES TESTED-19



MFG.-GENERAL INSTRUMENTS
 TYPE-COIL
 DESCRIPTION-SM-R-249219

CHART NO. 58
 NO. OF SAMPLES TESTED-19



General Instruments
FW Sickles Division
MS 7500B-8
RF coil

2.2 μ H
at 7.9 Mc

Molded
Cylindrical, axial lead
0.45 x 0.18" diam.

SOAK PERIOD: None

NOTE: Due to the low inductance value of the component relative to the inherent inductance of the test system measurements within the chamber were considered invalid.

The set was subjected to the entire pressure test program, however, only the readings taken before and after test were graphed. These readings appear in the first and last positions on the opposite graph.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change after completion of test.

General Instruments
M-6-249219
Coil

12 μ H
at 150 kc

Toroidal, molded
Pill box, radial lead
0.75 x 0.7 x 0.15"

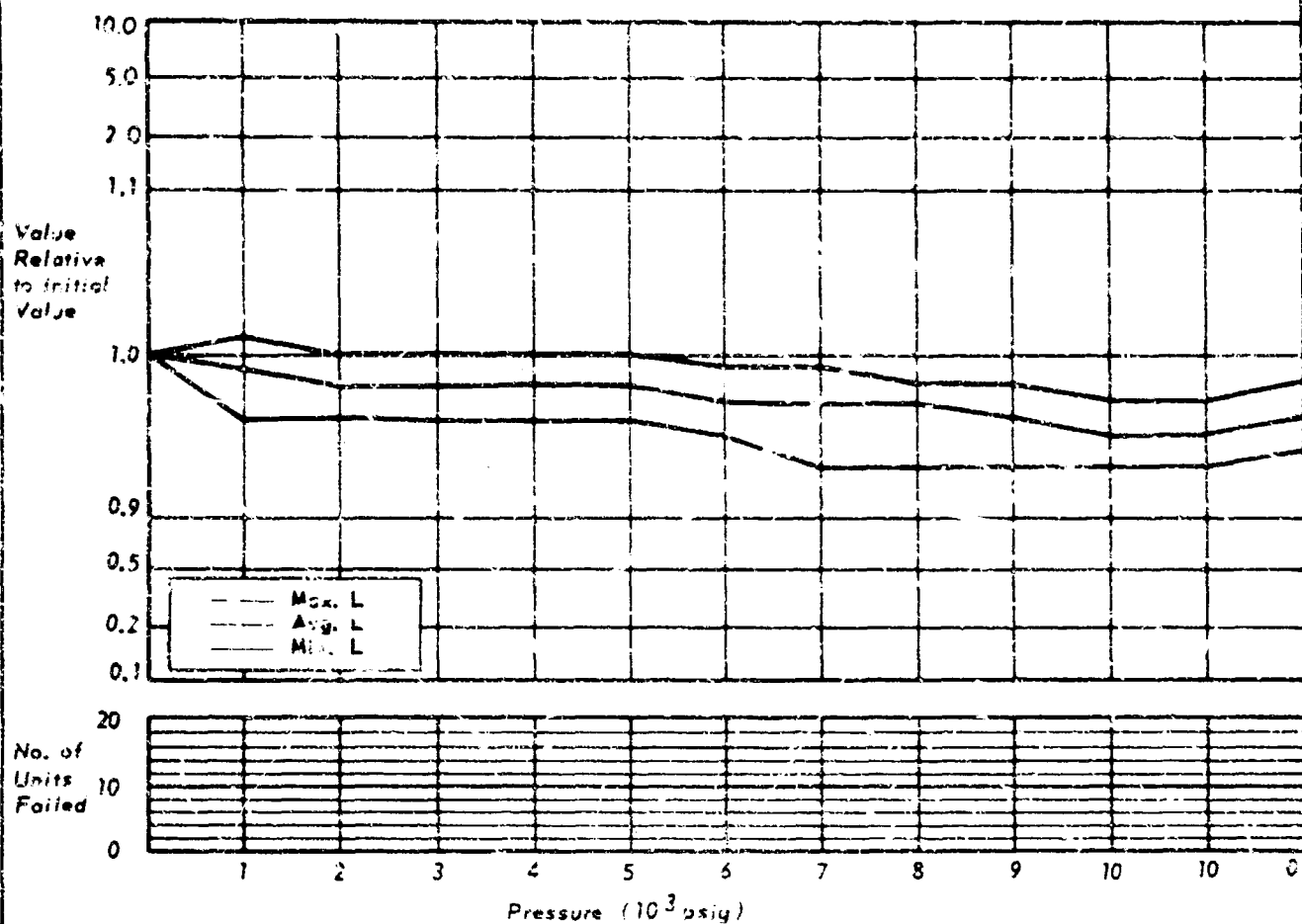
SOAK PERIOD: None

MECHANICAL: No apparent damage.

ELECTRICAL: Eighteen components indicated less than 10% change. One component indicated a change greater than 10% and less than 50%.

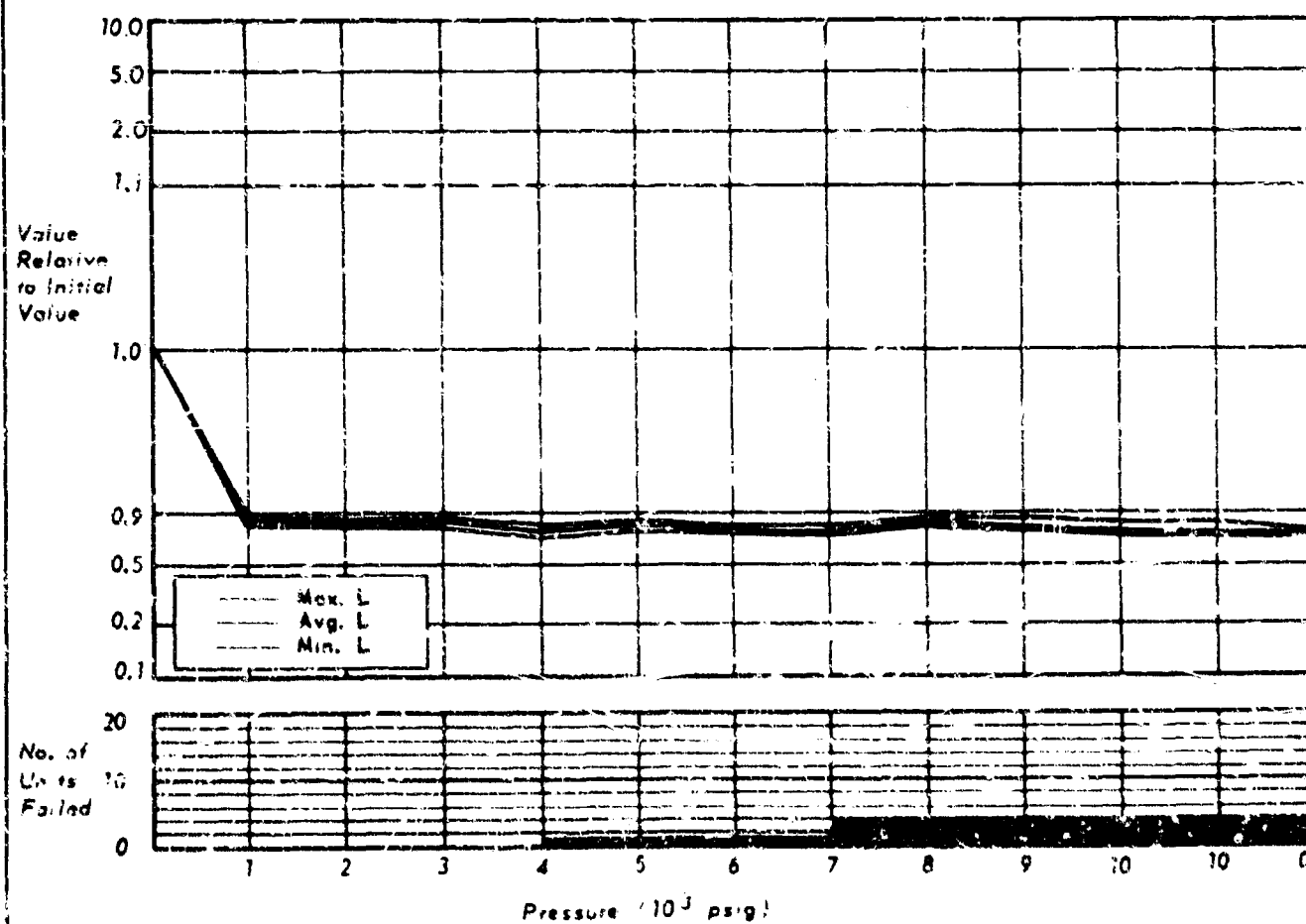
MFG - MICROTRAN
 TYPE - COIL, AUDIO CHOKE
 DESCRIPTION - PM 3P-M

CHART NO. 59
 NO. OF SAMPLES TESTED - 8



MFG - MICROTRAN
 TYPE - COIL, CHOKE
 DESCRIPTION - UM 2P

CHART NO. 60
 NO. OF SAMPLES TESTED - 5



Microtran
PM 39-M
Audio choke coil

6 H
2 mA dc
1800 DCR

Epoxy molded
Rectangular, parallel base lead
0.465 x 0.41 x 0.3"

SOAK PERIOD: None
MECHANICAL: No apparent damage.
ELECTRICAL: All components indicated less than 10% change.

Microtran
UM 28-M
Choke coil

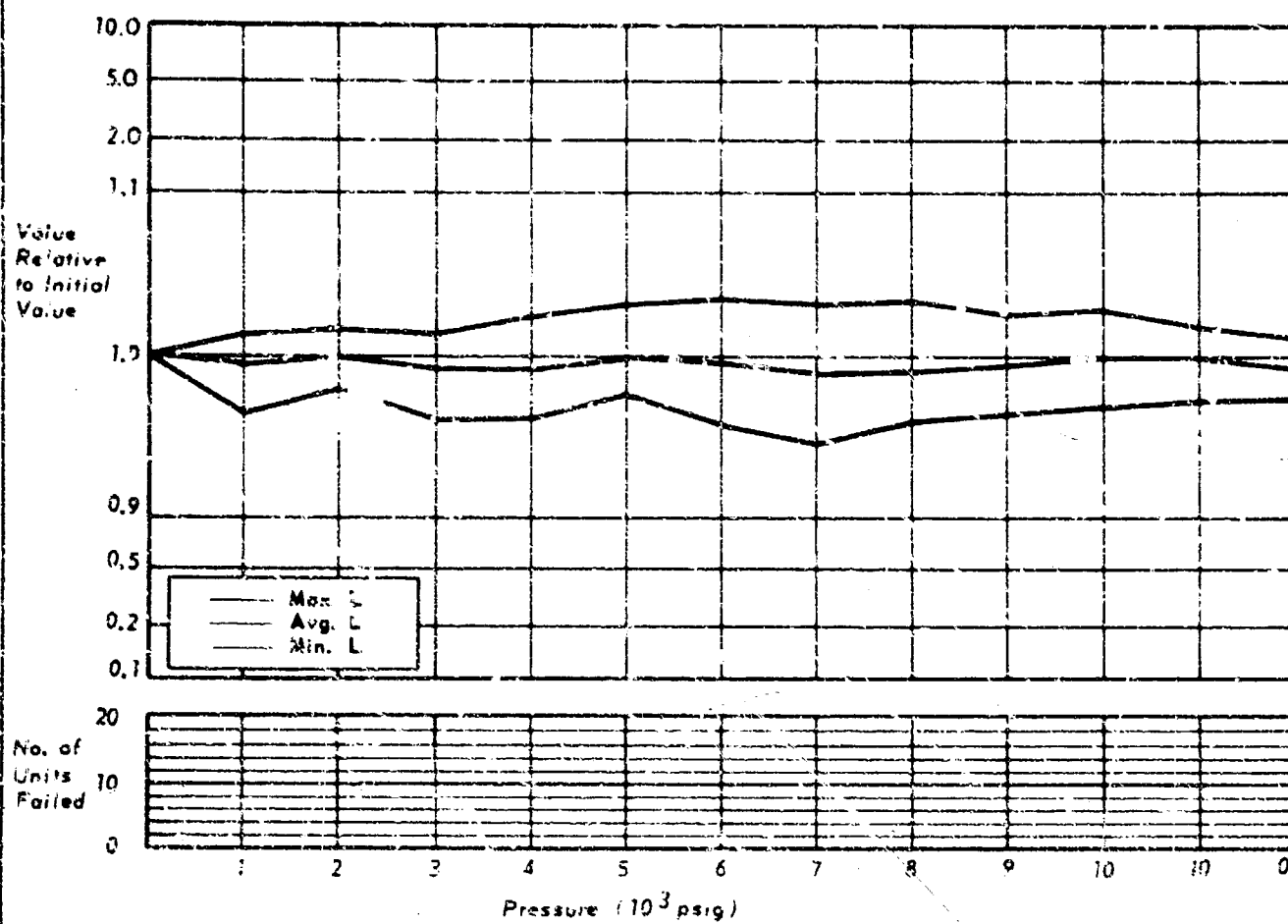
8 H
0.5 mA dc

Epoxy potted
0.5 x 9.562 x 0.437"

SOAK PERIOD: None
MECHANICAL: Visual inspection after completion of test showed a fractured case on one sample.
ELECTRICAL: One component indicated a change greater than 10% and less than 50% change.
FAILURES: Four components indicated a permanent change greater than 50%.

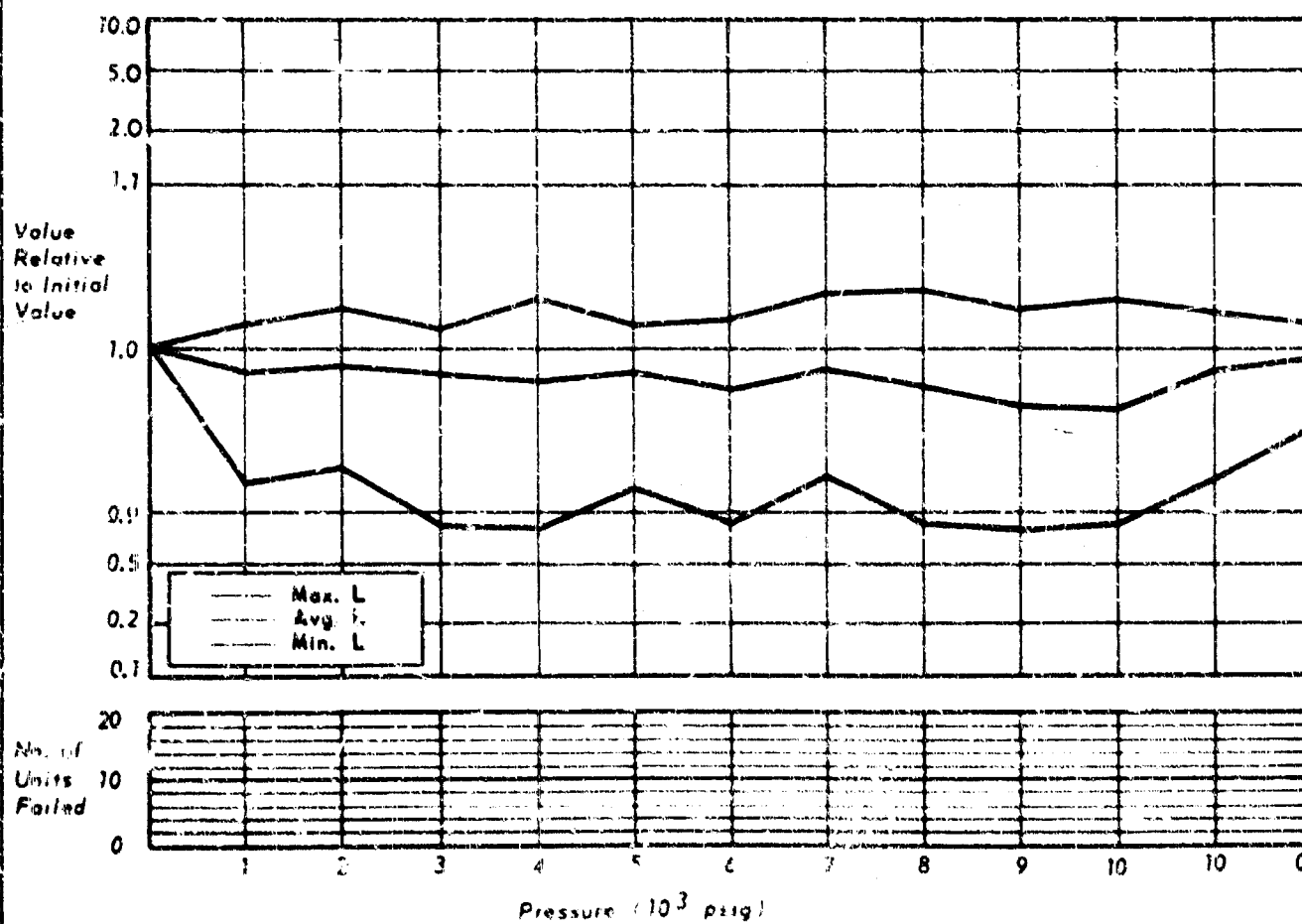
MFG. - J. W. MILLER
 TYPE - R. F. CHOKE
 DESCRIPTION - 8230-00

CHART NO. 61
 NO. OF SAMPLES TESTED - 18



MFG. - J. W. MILLER
 TYPE - R. F. CHOKE
 DESCRIPTION - 8240-70P

CHART NO. 62
 NO. OF SAMPLES TESTED - 17



J. W. Miller

9230-00

R. F. choke

SOAK PERIOD: None

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

$0.15 \mu\text{H} \pm 10\%$

at 25 Mc

Molded case

Tubular, axial lead

$0.25 \times 0.10''$ diam.

J. W. Miller

9240-708

R. F. choke

SOAK PERIOD: None

MECHANICAL: No apparent damage.

ELECTRICAL: Sixteen components indicated less than 10% change.

One component indicated a change greater than 10% and less than 50%.

$1.0 \mu\text{H} \pm 10\%$

at 25 Mc

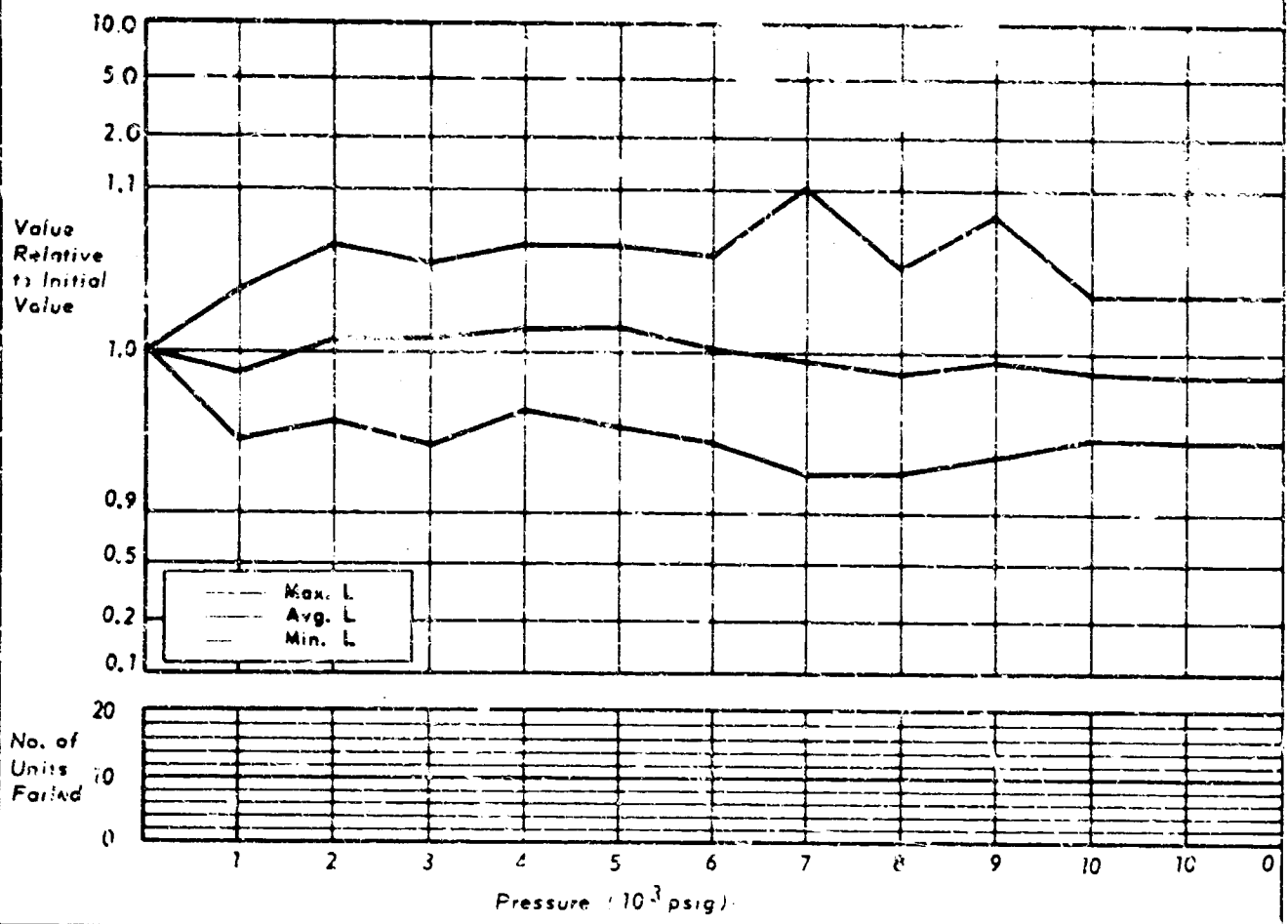
Molded, shielded

Tubular, axial lead

$0.375 \times 0.15''$ diam.

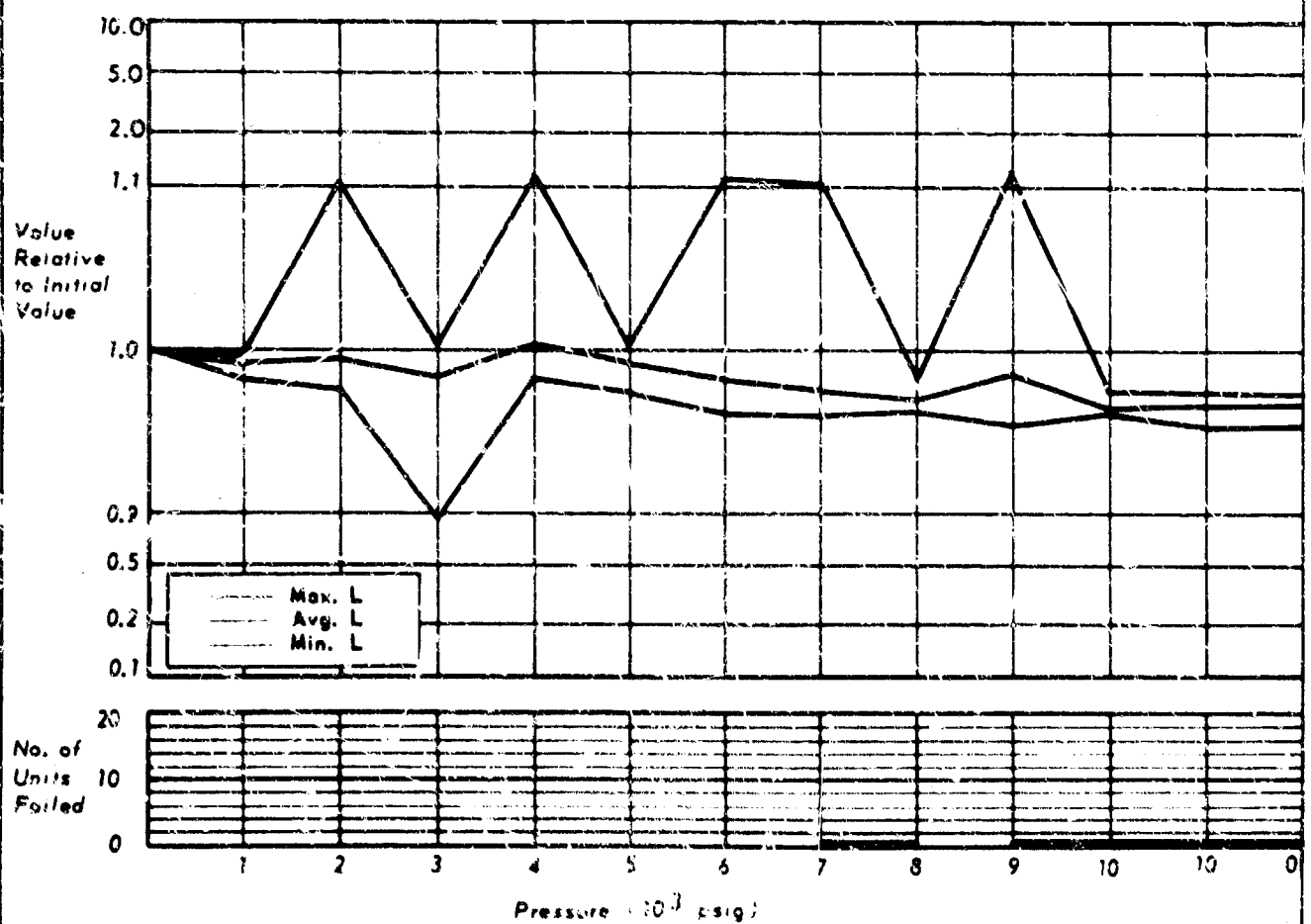
MFG.-J.W. MILLER
 TYPE-RF CHOKE COIL
 DESCRIPTION-9230-00

CHART NO. 53
 NO. OF SAMPLES TESTED-30



MFG.-J.W. MILLER
 TYPE-RF CHOKE COIL
 DESCRIPTION-9220-00

CHART NO. 64
 NO. OF SAMPLES TESTED-19



J. W. Miller

9230-68

R. F. choke

SOAK PERIOD: 16 hours at 8,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

$100 \pm 10\%$

at 2.5 Mc

Molded

Tubular, axial lead

0.25 x 0.10" diam.

J. W. Miller

9220-00

R. F. choke

SOAK PERIOD: 16 hours at 8,000 psig.

MECHANICAL: No apparent damage.

FAILURE: The inductance varied more than 50% on one component at the pressures shown on graph on opposite page.

$270 \mu H \pm 5\%$

at 0.79 Mc

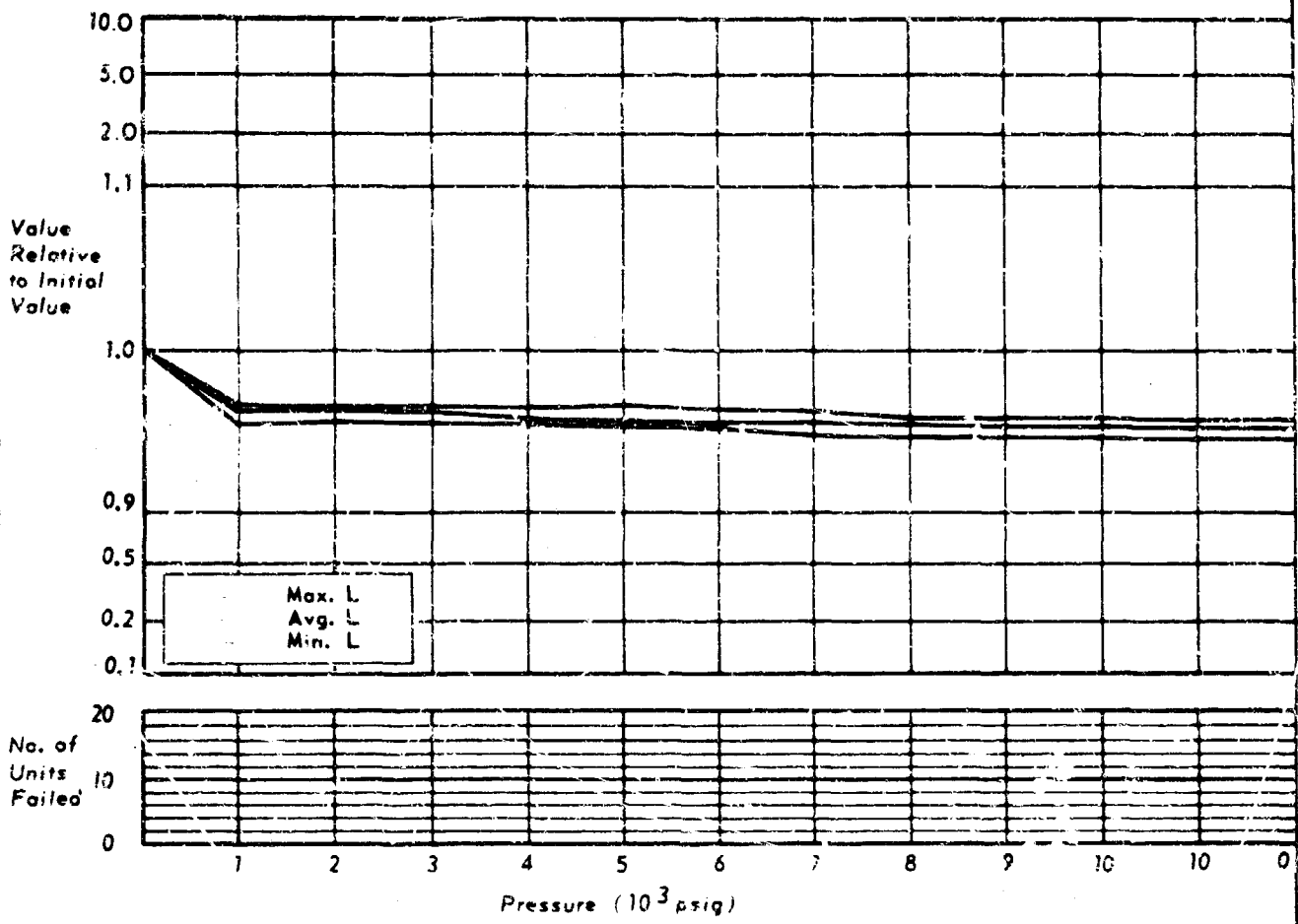
Molded

Tubular, axial lead

0.44 x 0.19" diam.

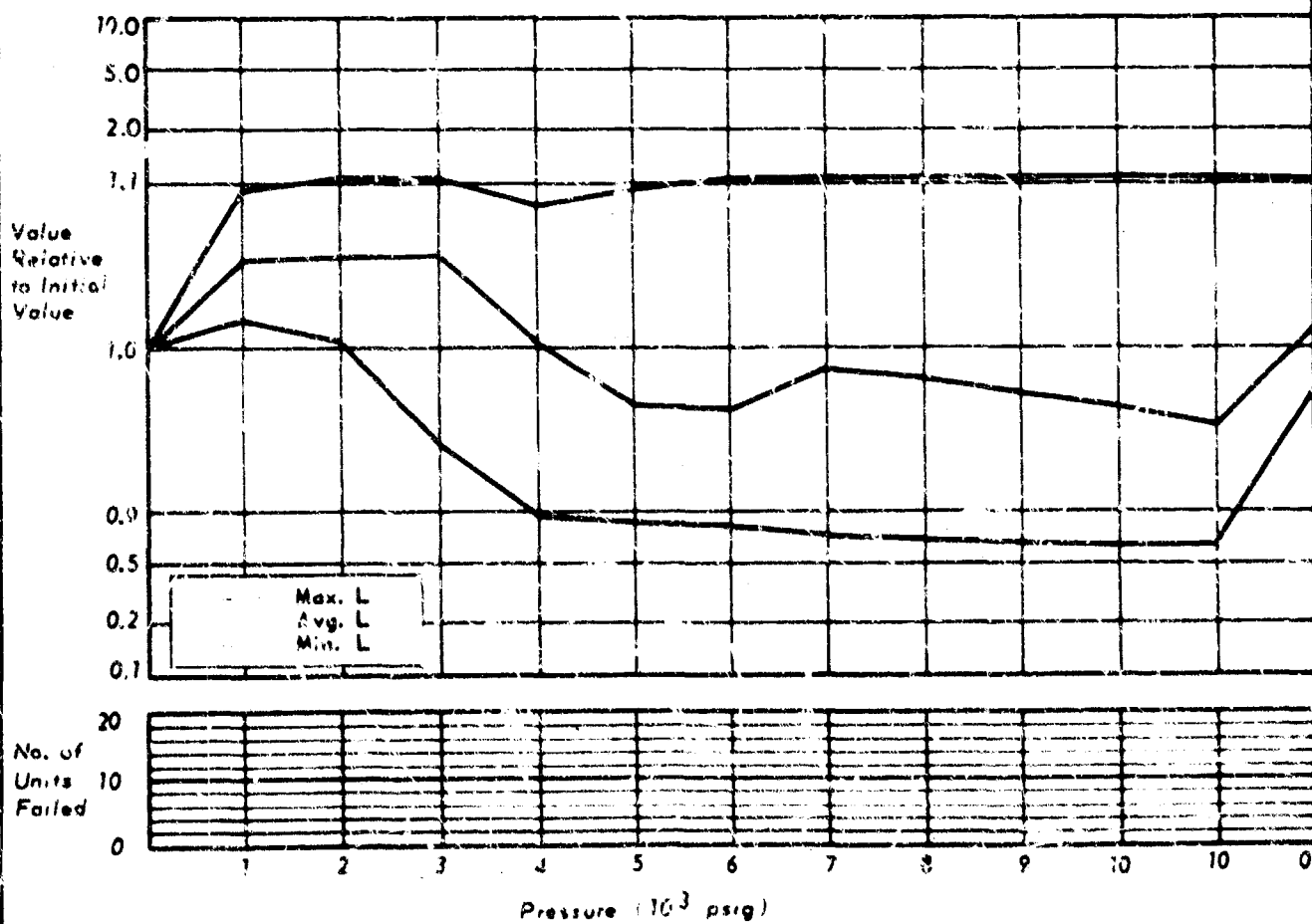
MFG. - J.W. MILLER
 TYPE - RF CHOKES
 DESCRIPTION - 9220-78

CHART NO. 65
 NO. OF SAMPLES TESTED - 19



MFG. - J.W. MILLER
 TYPE - RF CHOKES
 DESCRIPTION - 9240-758

CHART NO. 66
 NO. OF SAMPLES TESTED - 17



J. W. Miller

9220-76

R. F. choke

SOAK PERIOD: 16 hours at 8,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

10,000 μ H $\pm$ 5%

at 0.25 Mc

Molded

Tubular, axial lead

0.74 x 0.24" diam.

J. W. Miller

7240-756

R. F. choke

SOAK PERIOD: None

MECHANICAL: No apparent damage.

ELECTRICAL: Nine components indicated less than 10% change.

Eight components indicated a change greater than 10% and less than 50%.

10 μ H $\pm$ 10%

at 250 kc

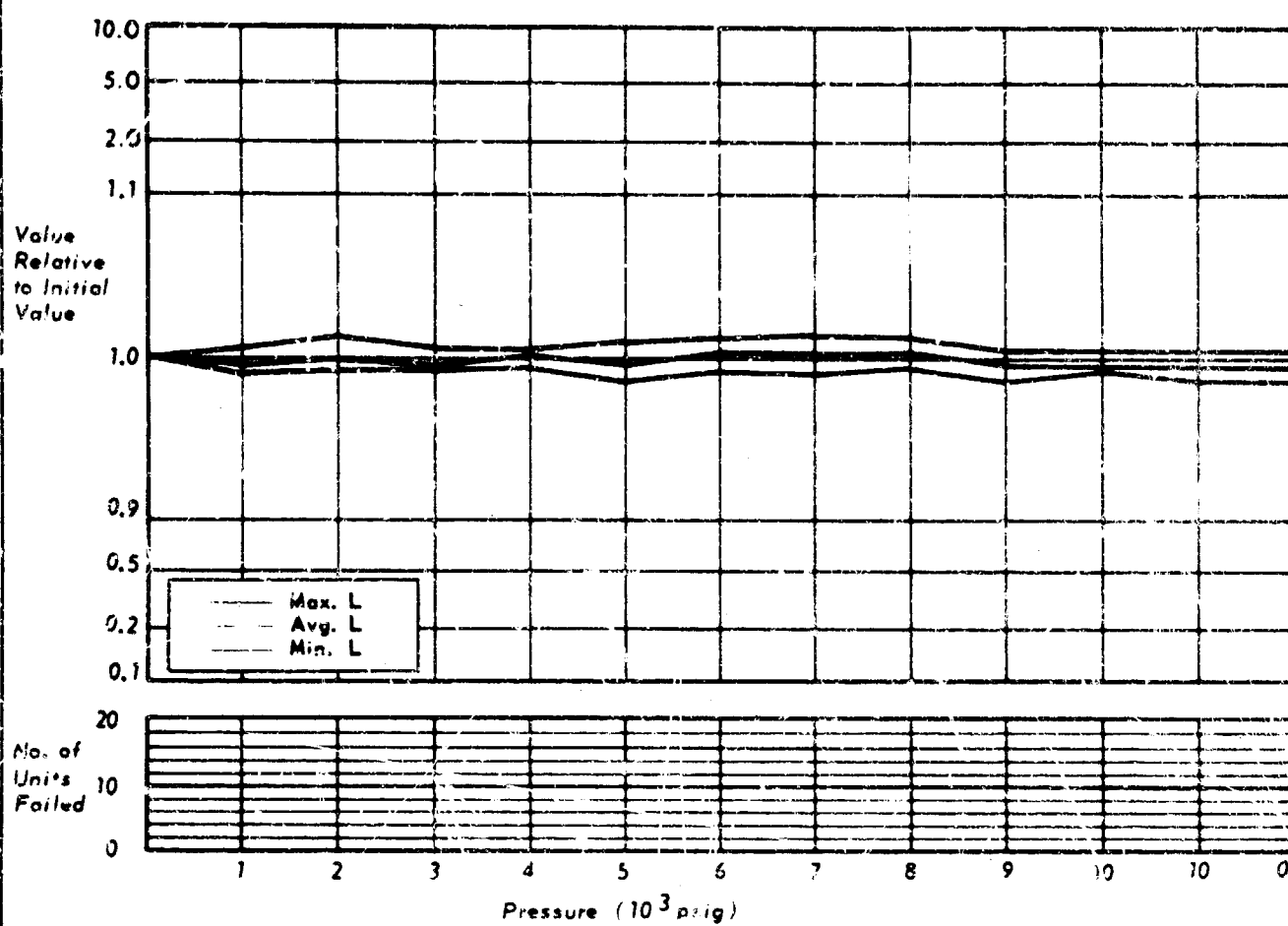
Molded, shielded

Tubular, axial lead

0.36 x 0.15" diam.

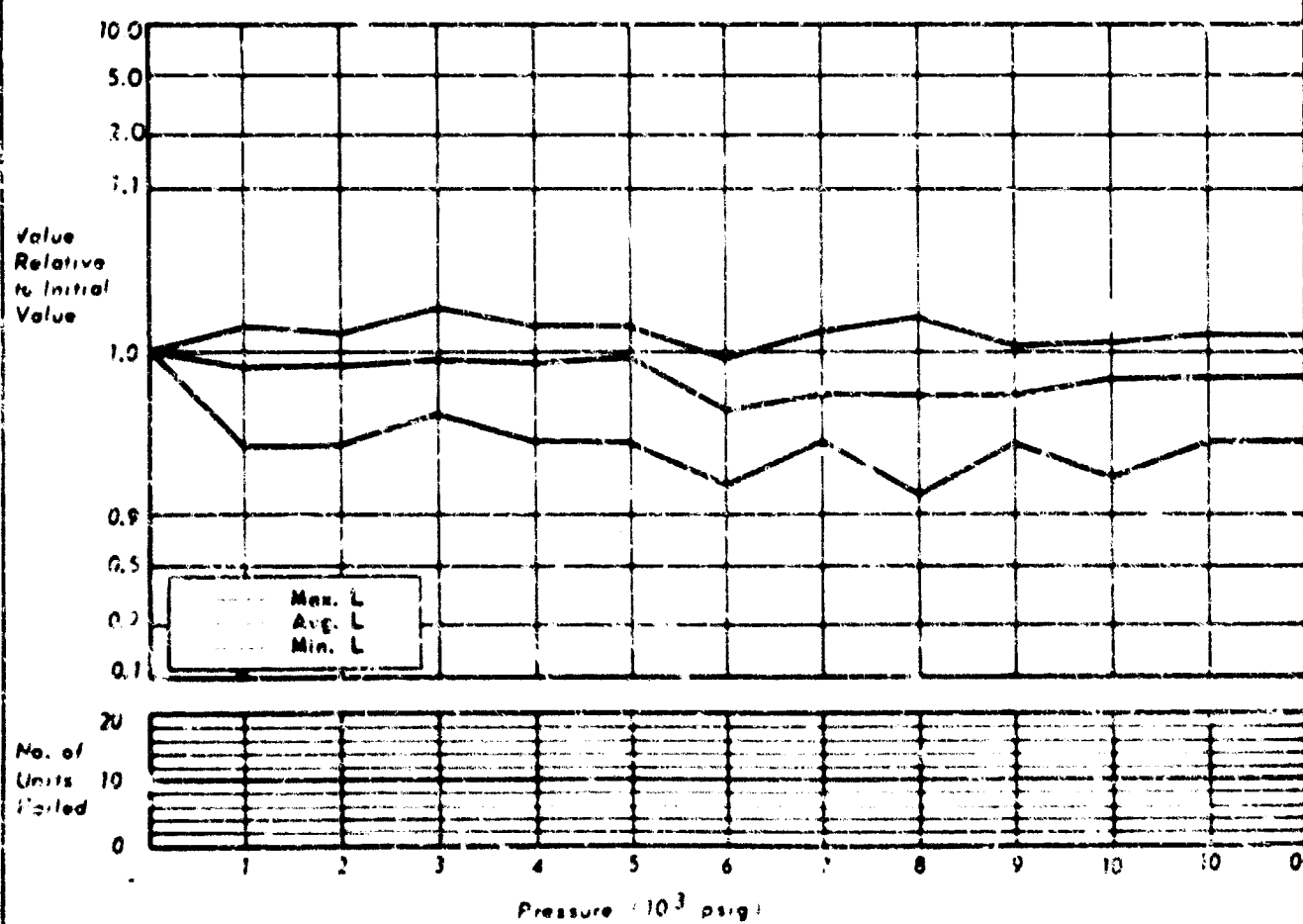
MFG.-J.W.MILLER
 TYPE-RF COIL
 DESCRIPTION-50A 1032R1

CHART NO. 67
 NO. OF SAMPLES TESTED-19



MFG.-J.W.MILLER
 TYPE-RF COIL
 DESCRIPTION-4632-E

CHART NO. 68
 NO. OF SAMPLES TESTED-20



J. W. Miller

50A 103 EBI

R. F. coil

SOAK PERIOD: None

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

0.77 to 1.25 μ H

at 25 kc

Encap, adjustable

Cylindrical, radial studs

1.0 x 0.625" diam.

J. W. Miller

4632-E

R. F. coil

SOAK PERIOD: 16 hours at 8,000 psig.

MECHANICAL: Visual inspection after completion of test showed a small fracture in the molded case of one sample.

ELECTRICAL: All components indicated less than 10% change.

100 μ H

at 2.5 Mc

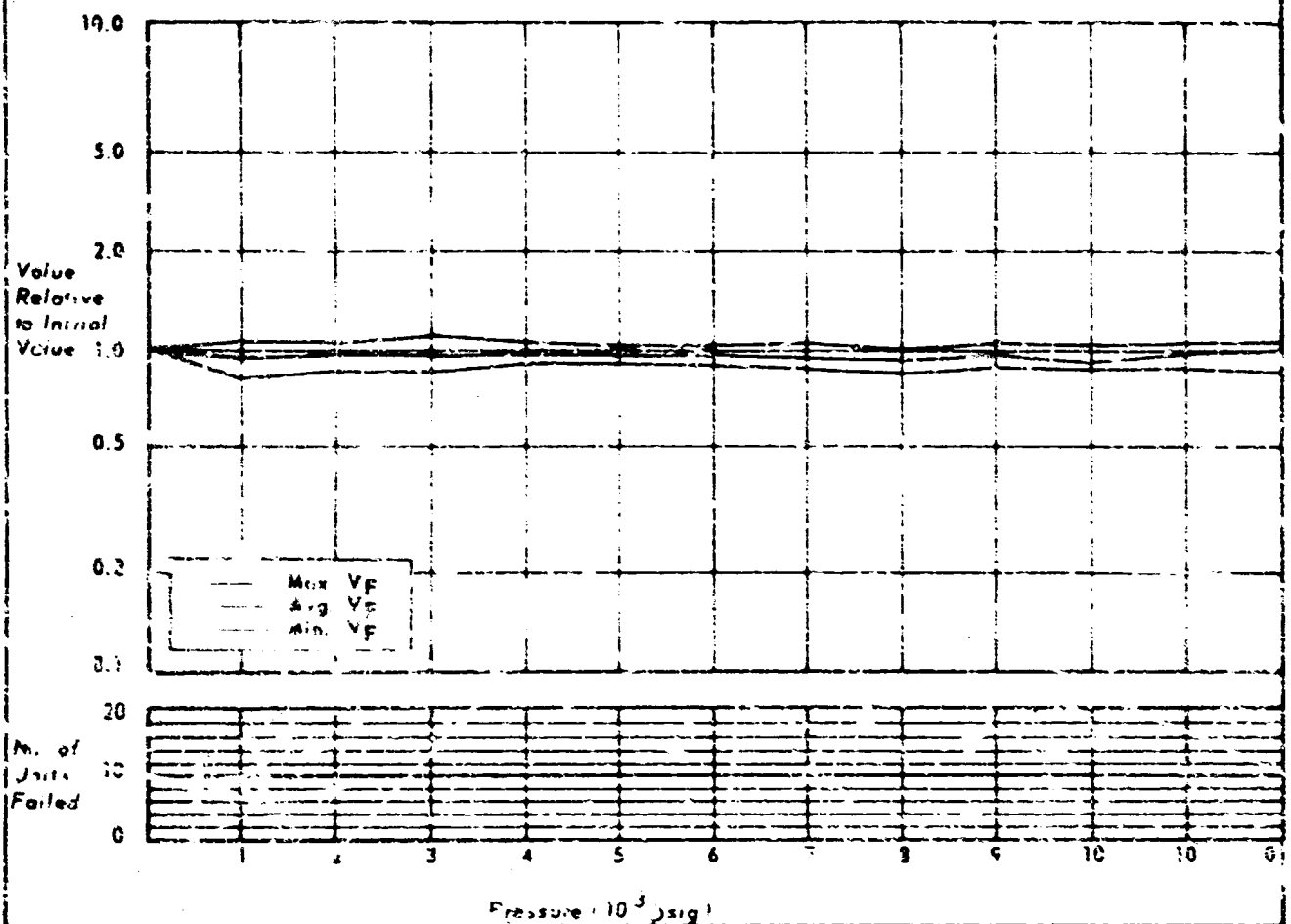
Encapsulated

Tubular, axial lead

1.125 x 0.375" diam.

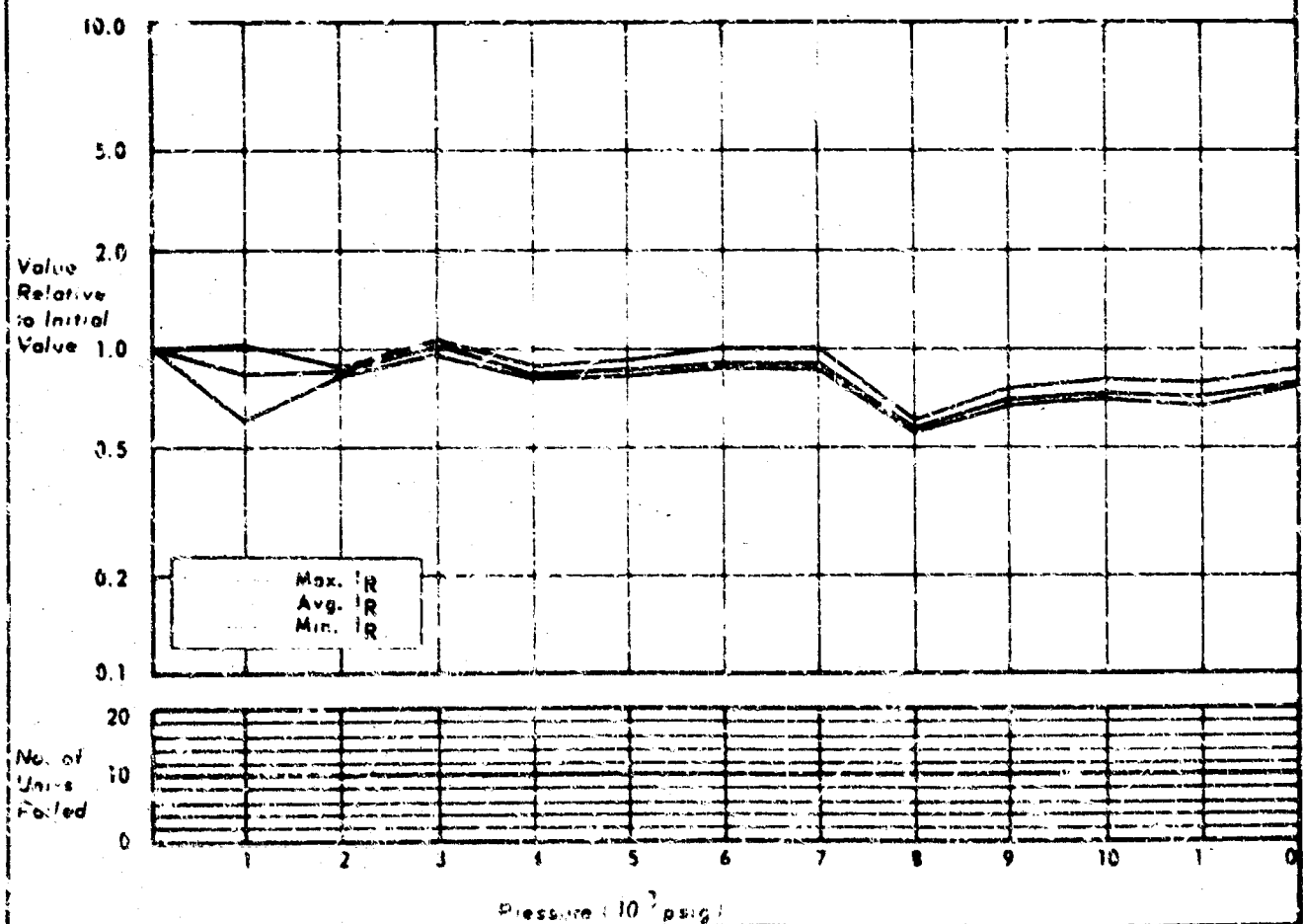
MFG. GENERAL INSTRUMENT
 TYPE DIODE
 DESCRIPTION IN649

CHART NO. 69
 NO. OF SAMPLES TESTED 19



MFG. TYPE
 DESCRIPTION (SAME AS ABOVE)

CHART NO. 70A
 NO. OF SAMPLES TESTED



General Instruments

1N 649

Diode, rectifier

P17 - 600 V

$I_{dc av}$ - 400

Silicone, glass

Tubular, axial lead

0.30 x 0.195" diam.

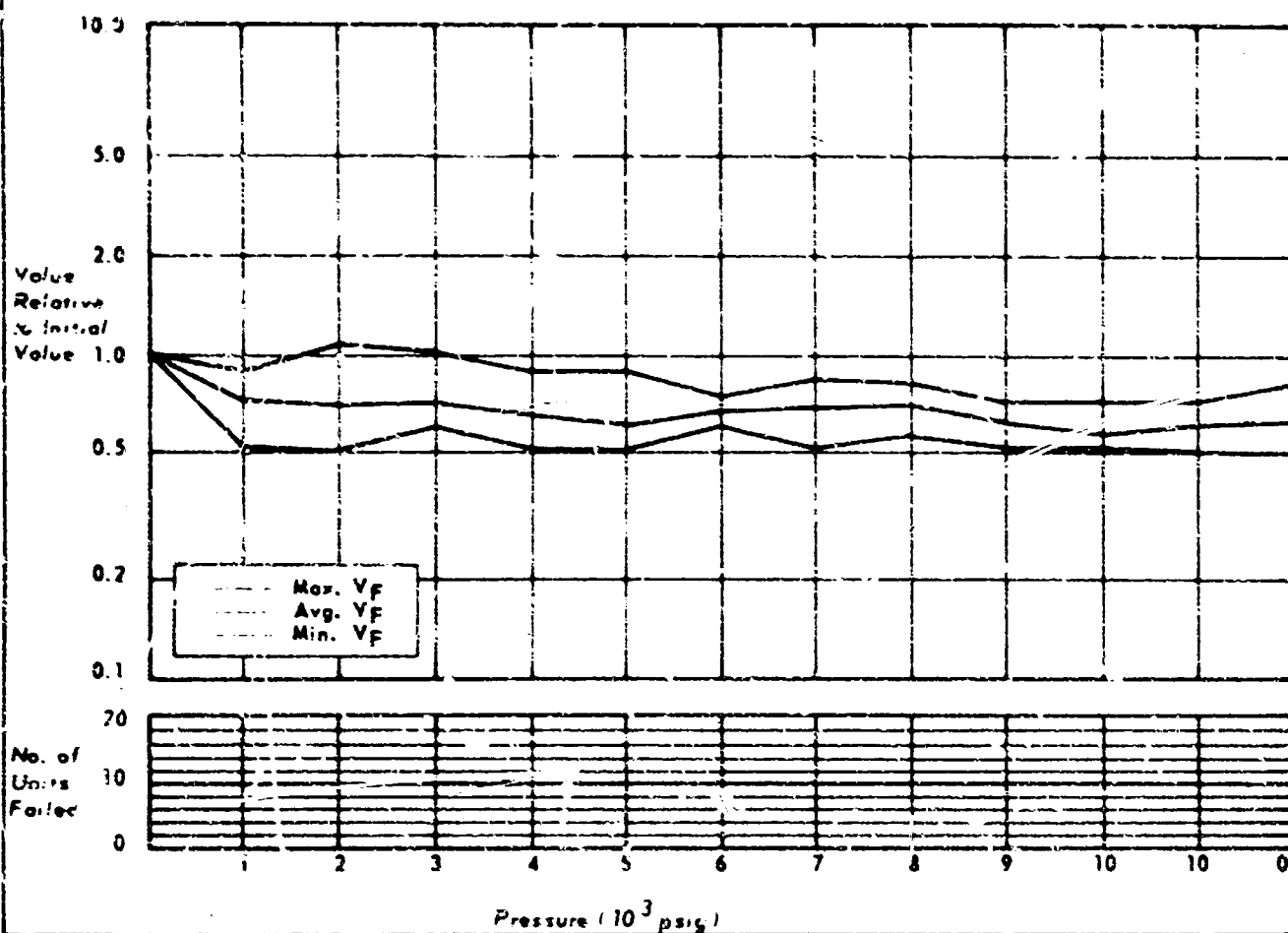
SOAK PERIOD: 16 hours at 8,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

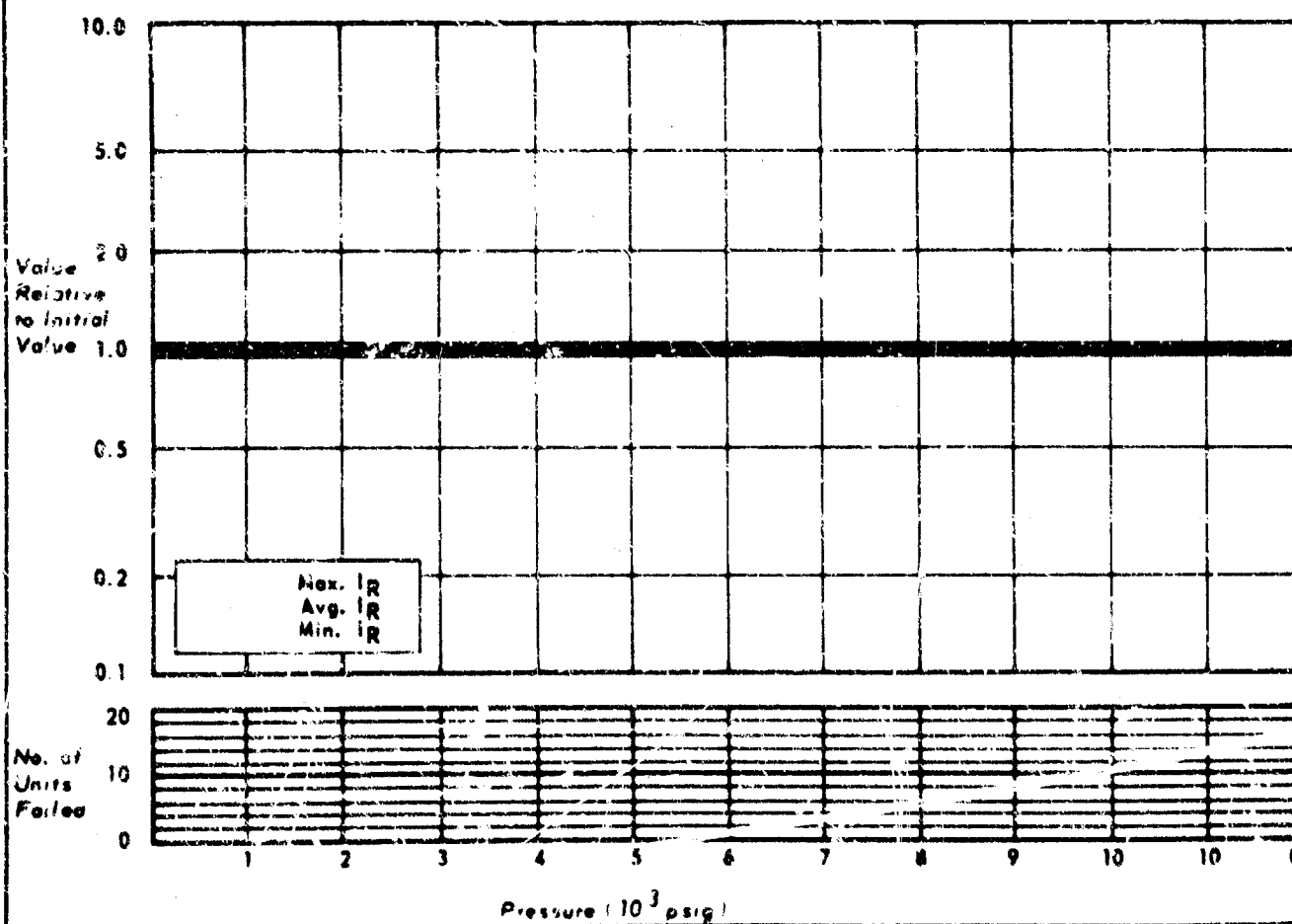
MFG. GENERAL INSTRUMENT
 TYPE - DIODE
 DESCRIPTION - 1N5246

CHART NO. 70
 NO. OF SAMPLES TESTED - 19



MFG. 1N5246
 DESCRIPTION (SAME AS ABOVE)

CHART NO. 70A
 NO. OF SAMPLES TESTED



General Instruments

IN 366M2

Diode

PIV = 80 V dc

$I_{dc \text{ avg.}} = 10 \text{ mA}$

Silicone

Glass case

0.36 x 0.15" diam.

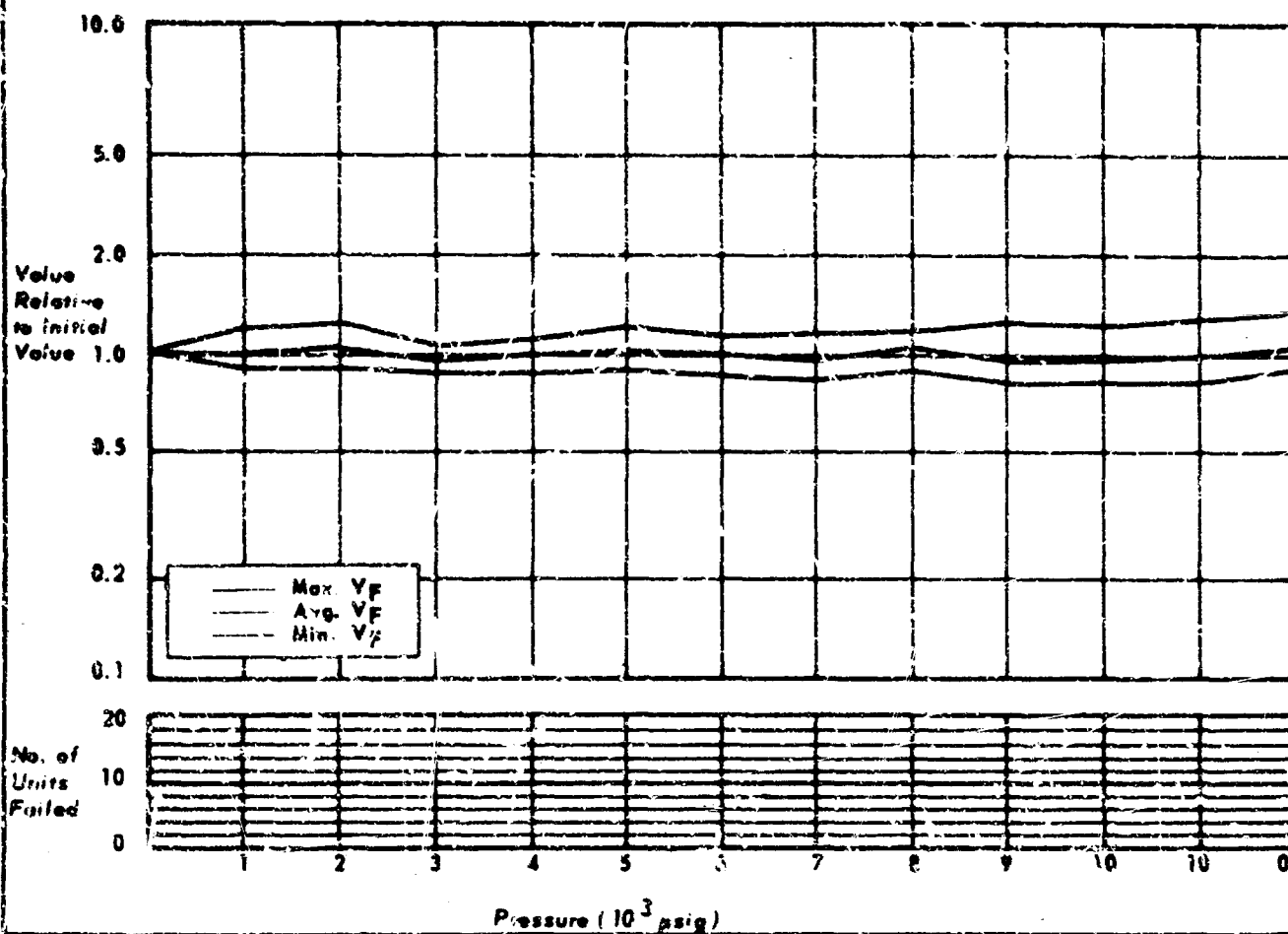
SOAK PERIOD: 14 hours at 6000 μ sig.

MECHANICAL: No apparent damage.

ELECTRICAL: Two components indicated less than 50% change and seventeen indicated greater than 70% and less than 50% change.

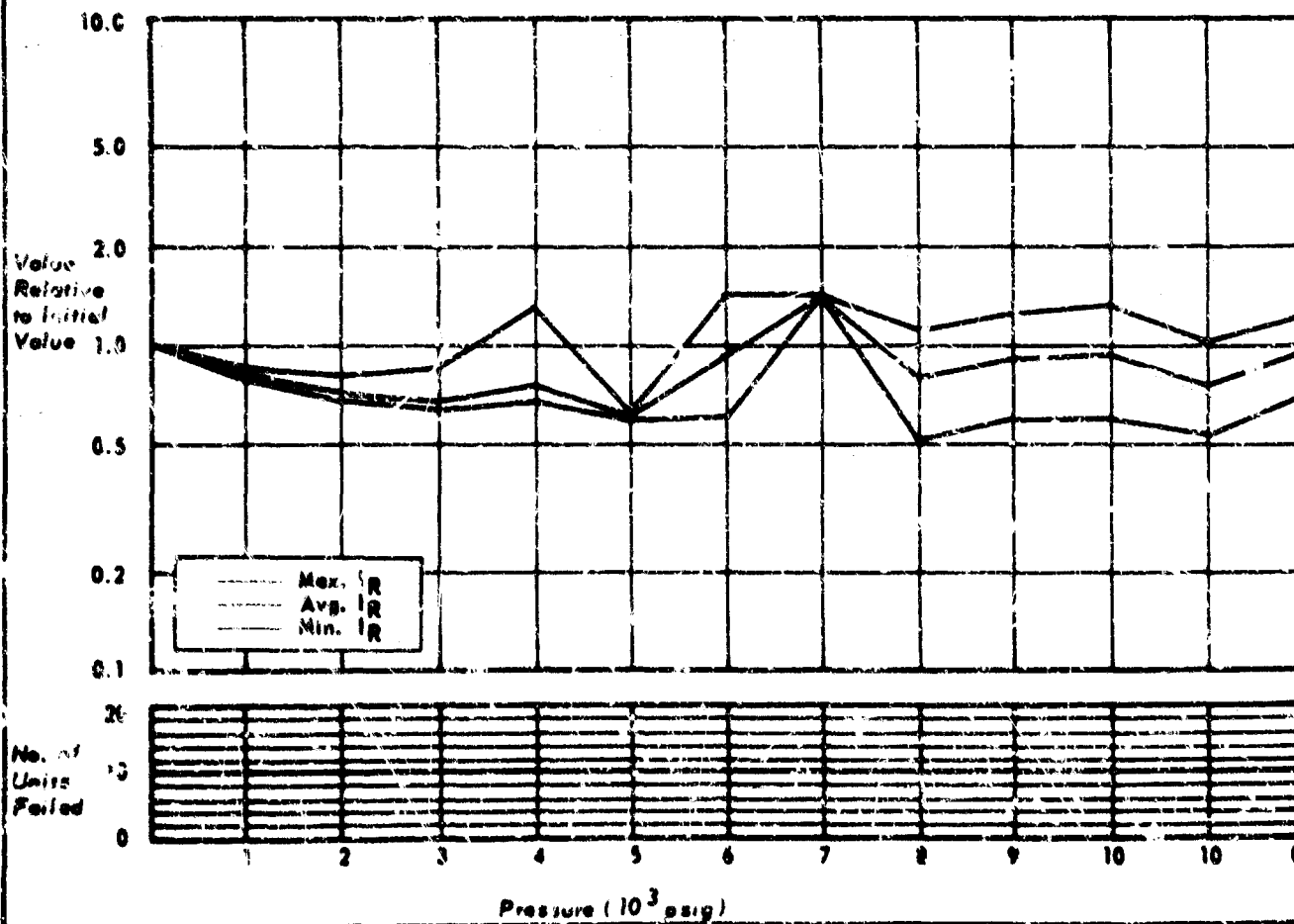
MFG. GENERAL INSTRUMENT
 TYPE DIODE
 DESCRIPTION 10047

CHART NO. 71
 NO. OF SAMPLES TESTED 20



MFG. TYPE
 DESCRIPTION (SAME AS ABOVE)

CHART NO. 71A
 NO. OF SAMPLES TESTED



General Instruments

1N 547

Diode, rectifier

PIV = 600 V

$I_{dc \text{ avg.}} = 250 \text{ mA}$

Silicone

DO case

0.90 x 0.40" diam

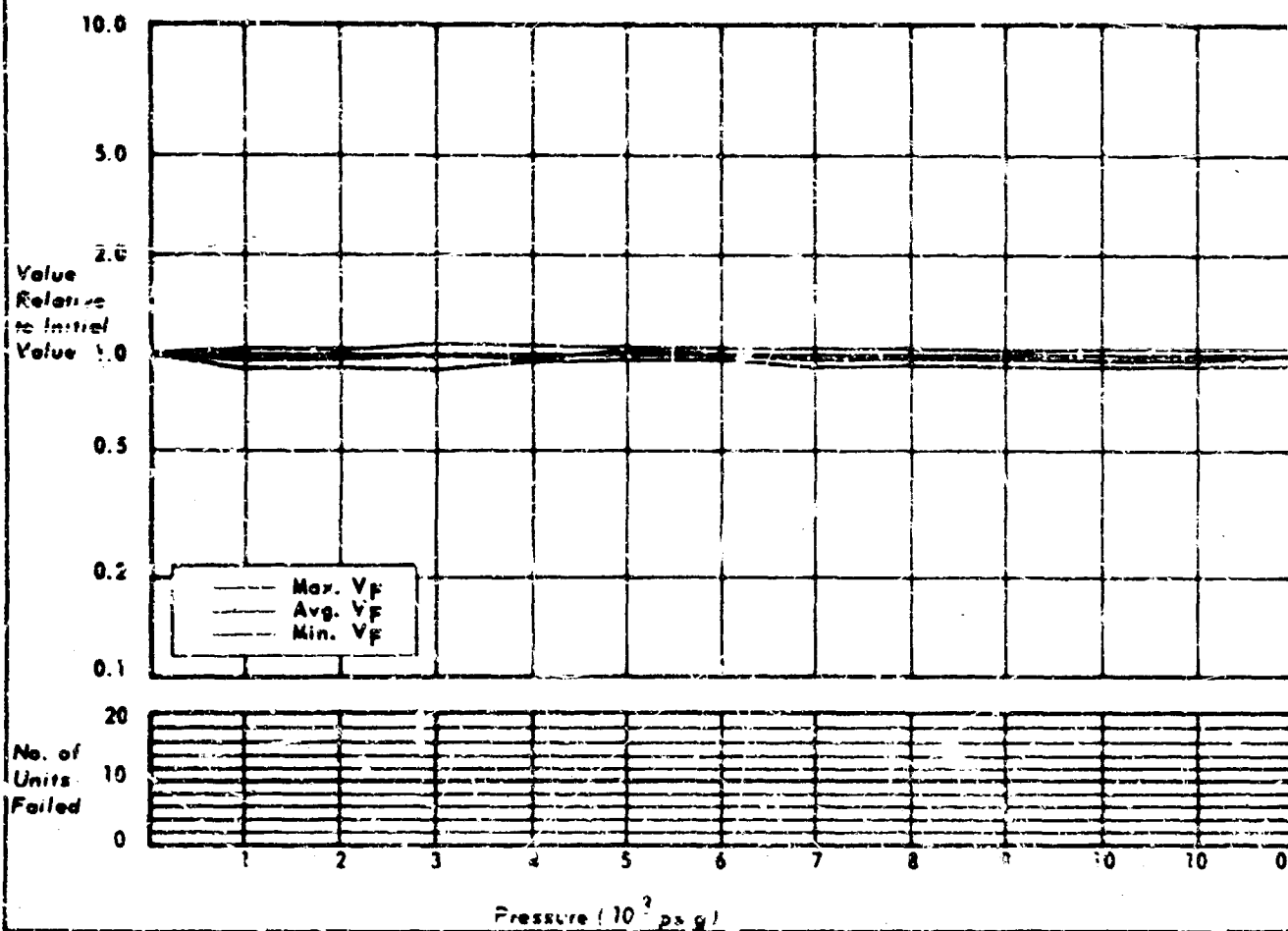
SOAK PERIOD: 16 hours at 10,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

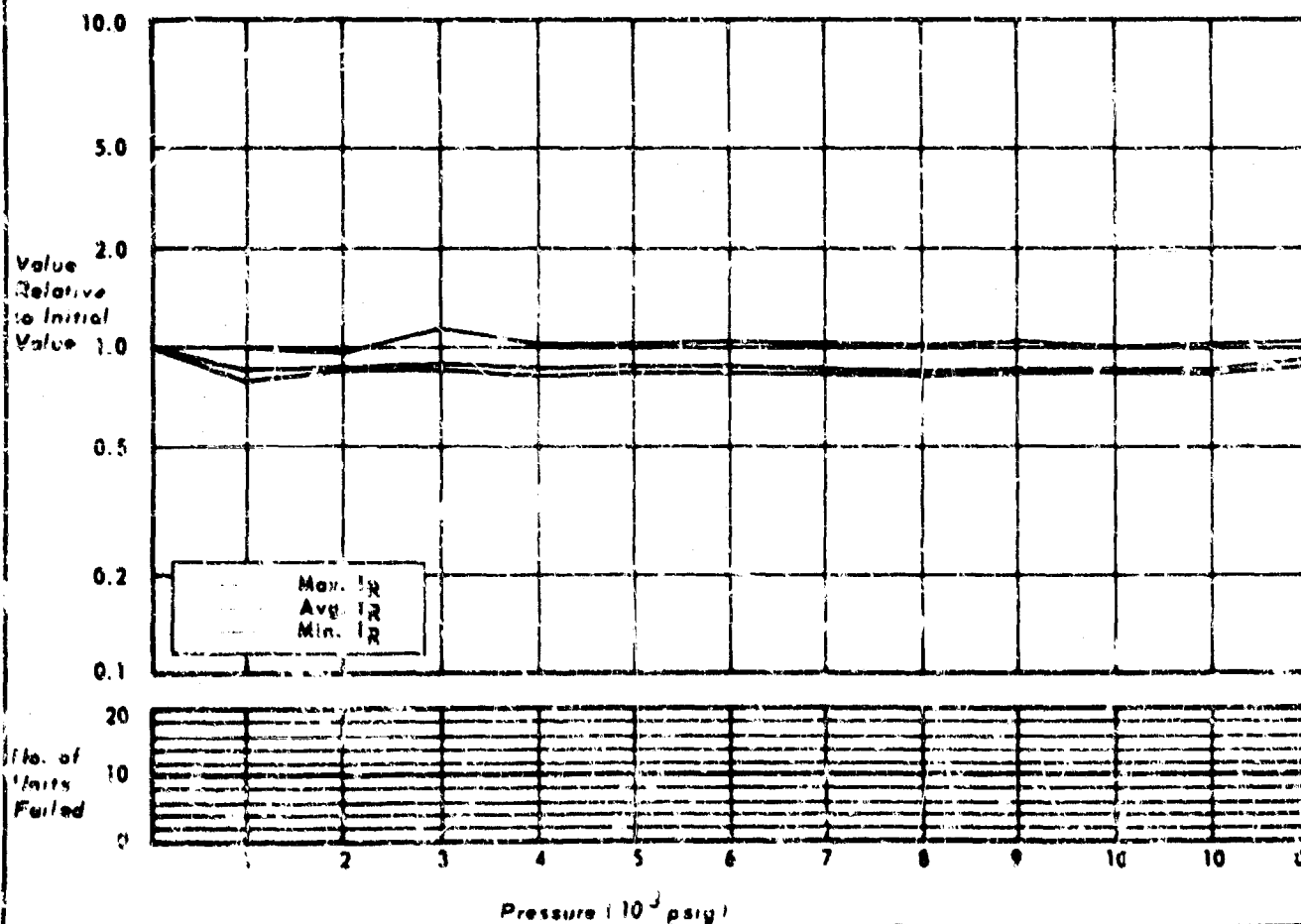
MFG.-GENERAL INSTRUMENT
 TYPE - DIODE
 DESCRIPTION - 1B1200A

CHART NO. 72
 NO. OF SAMPLES TESTED - 20



MFG.
 TYPE
 DESCRIPTION (SAME AS ABOVE)

CHART NO. 72A
 NO. OF SAMPLES TESTED



General Instruments

1N 1206A

Diode, rectifier

PIV = 50-600 V

$I_{dc \text{ avg.}} = 6 \text{ Amp}$

Silicone

DO case

Stud mount

0.40 x 0.40" diam

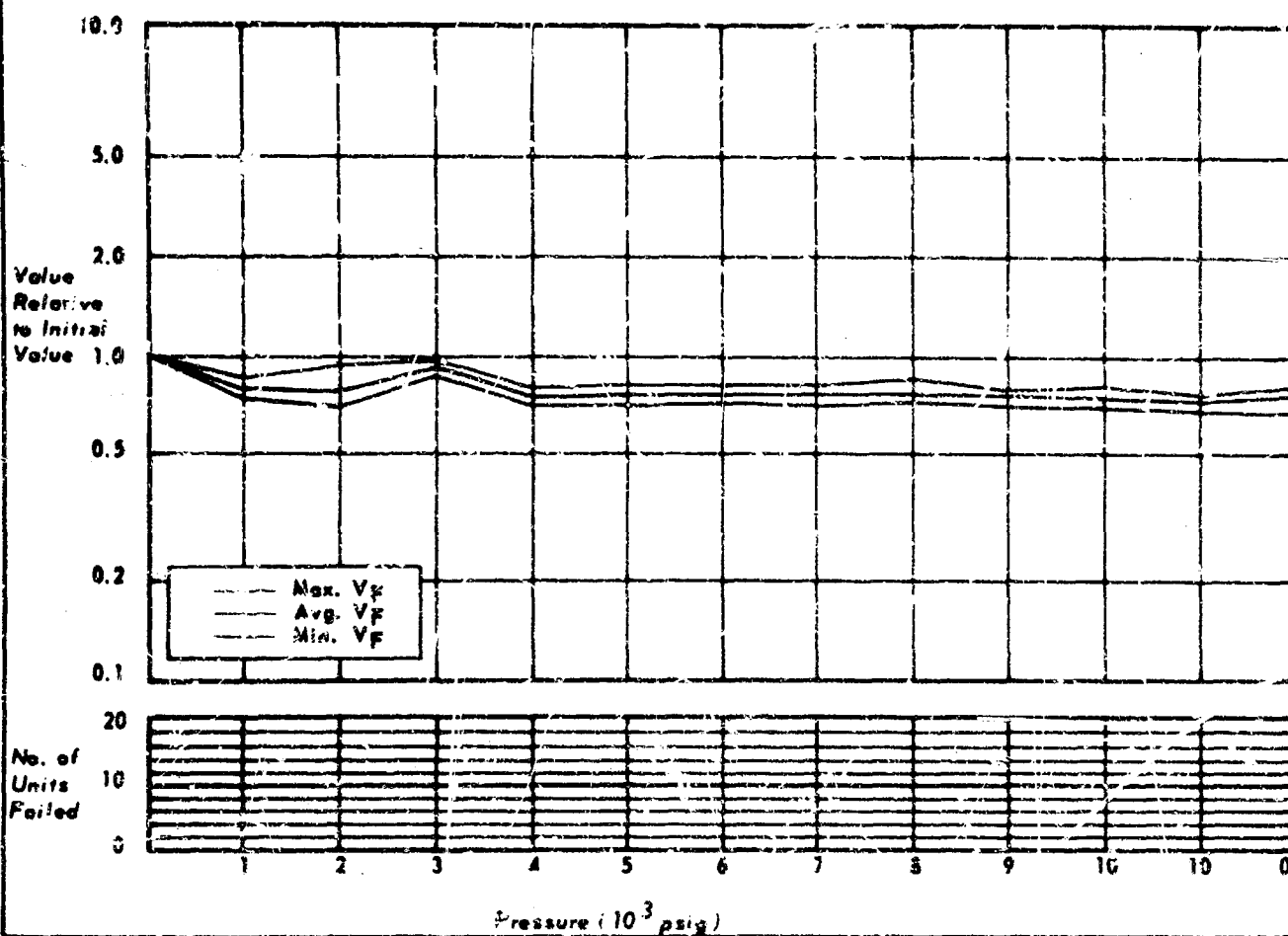
SOAK PERIOD: None

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

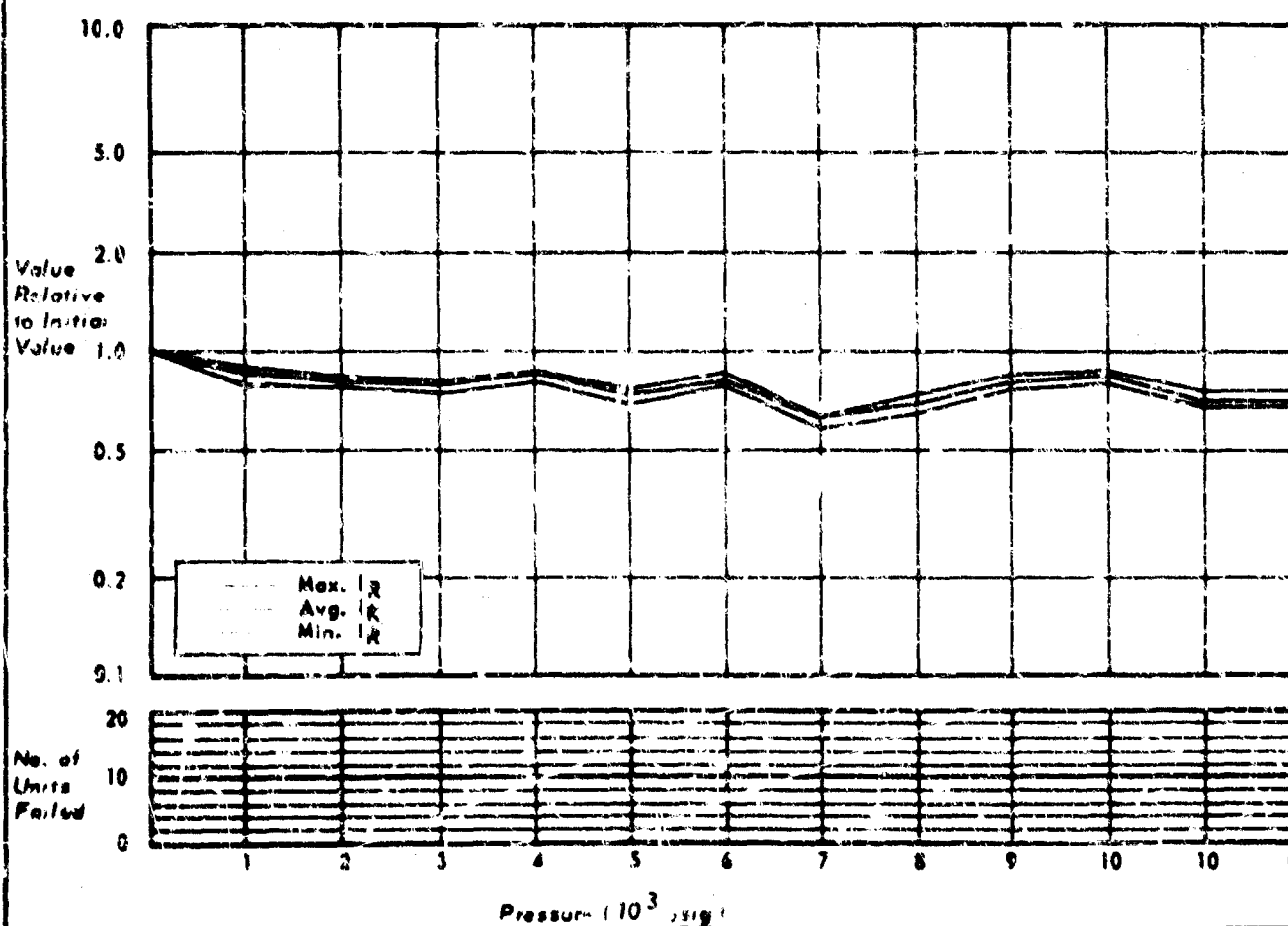
MFG. GENERAL INSTRUMENT
 TYPE-D100E, RECTIFIER
 DESCRIPTION-6100J

CHART NO. 73
 NO. OF SAMPLES TESTED-20



MFG.
 TYPE
 DESCRIPTION (SAME AS ABOVE)

CHART NO. 73A
 NO. OF SAMPLES TESTED



General Instruments

G 100 J

Diode, rectifier

PIV = 600 V

$I_{dc \text{ avg.}} = 1.0 \text{ Amp}$

Silicone

Lead mount

Glass encap

0.36 x 0.15" diam

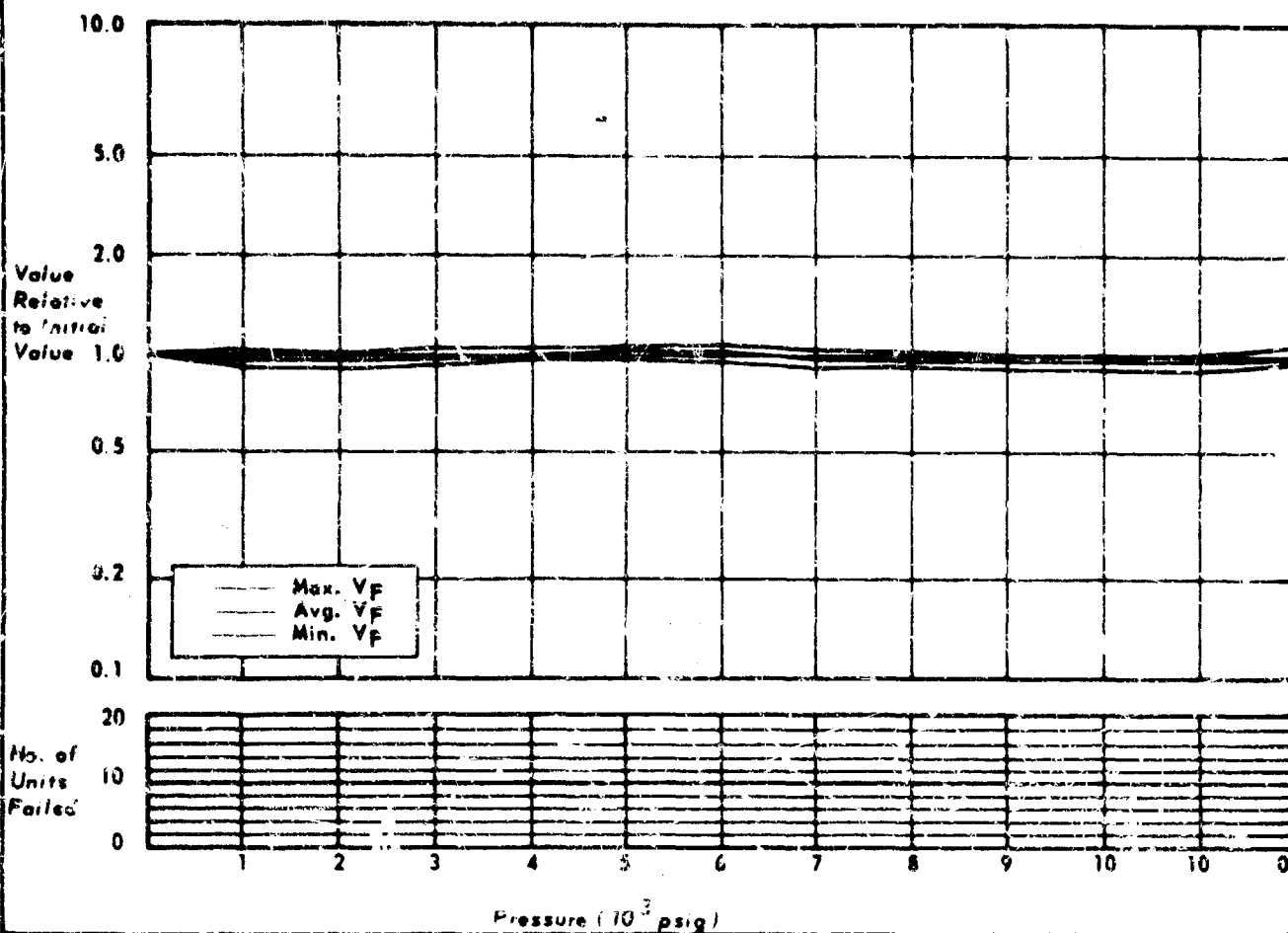
SOAK PERIOD: 16 hours at 10,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated a change greater than 10% and less than 50%.

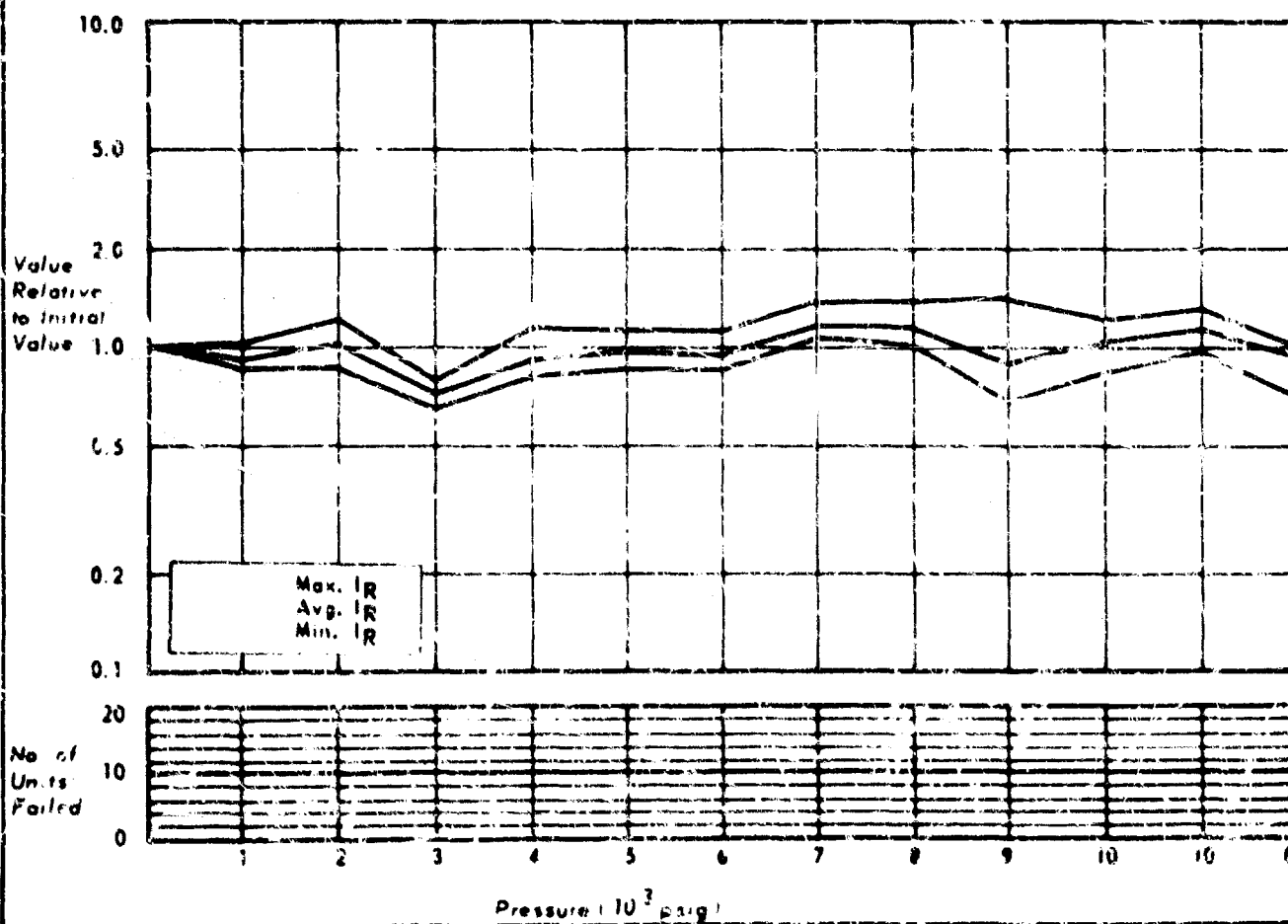
MFG. - MOTOROLA
 TYPE - DIODE, RECTIFIER
 DESCRIPTION - IN3191

CHART NO. 74
 NO. OF SAMPLES TESTED - 19



MFG.
 TYPE
 DESCRIPTION - (SAME AS ABOVE)

CHART NO. 74A
 NO. OF SAMPLES TESTED



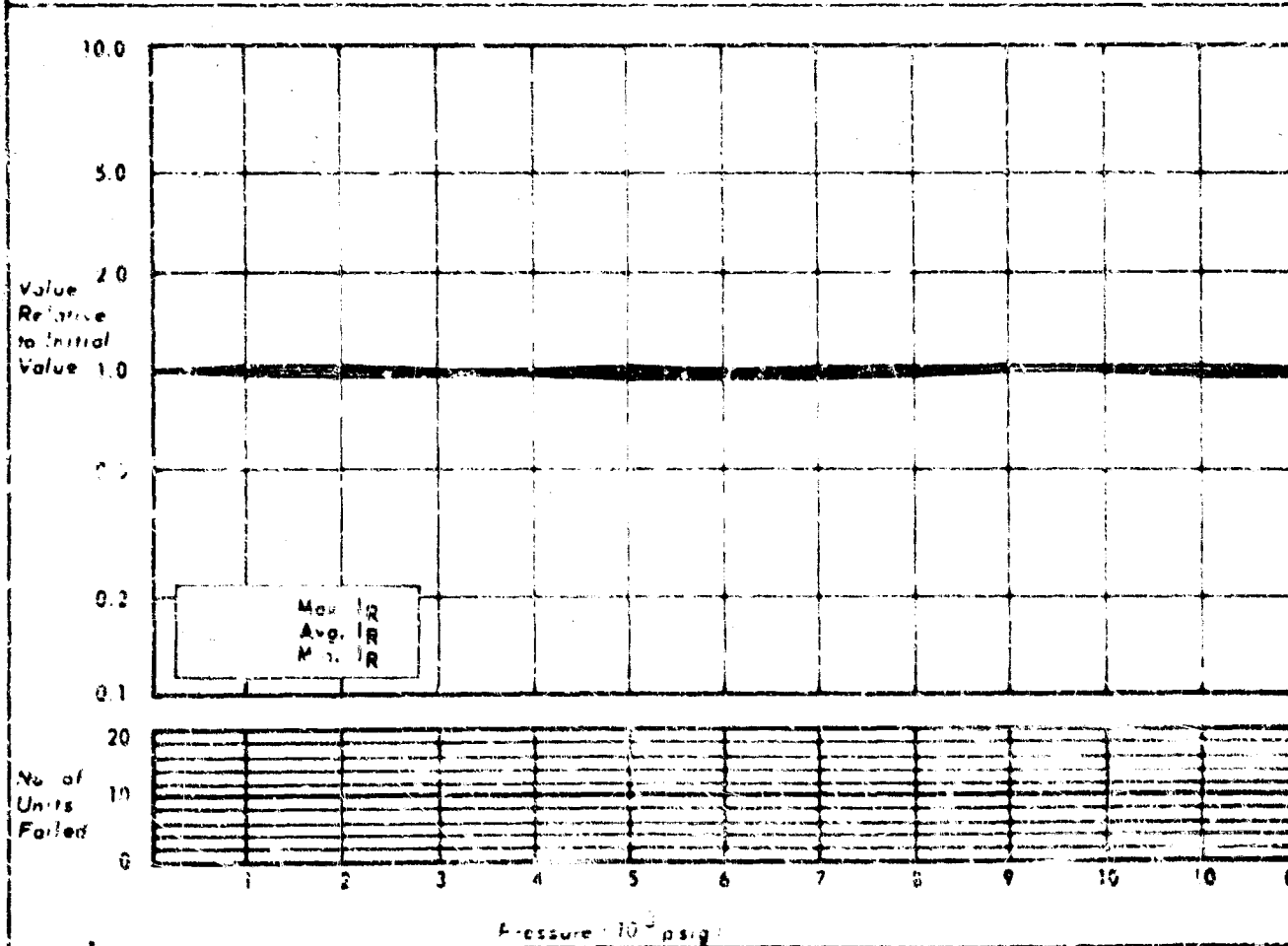
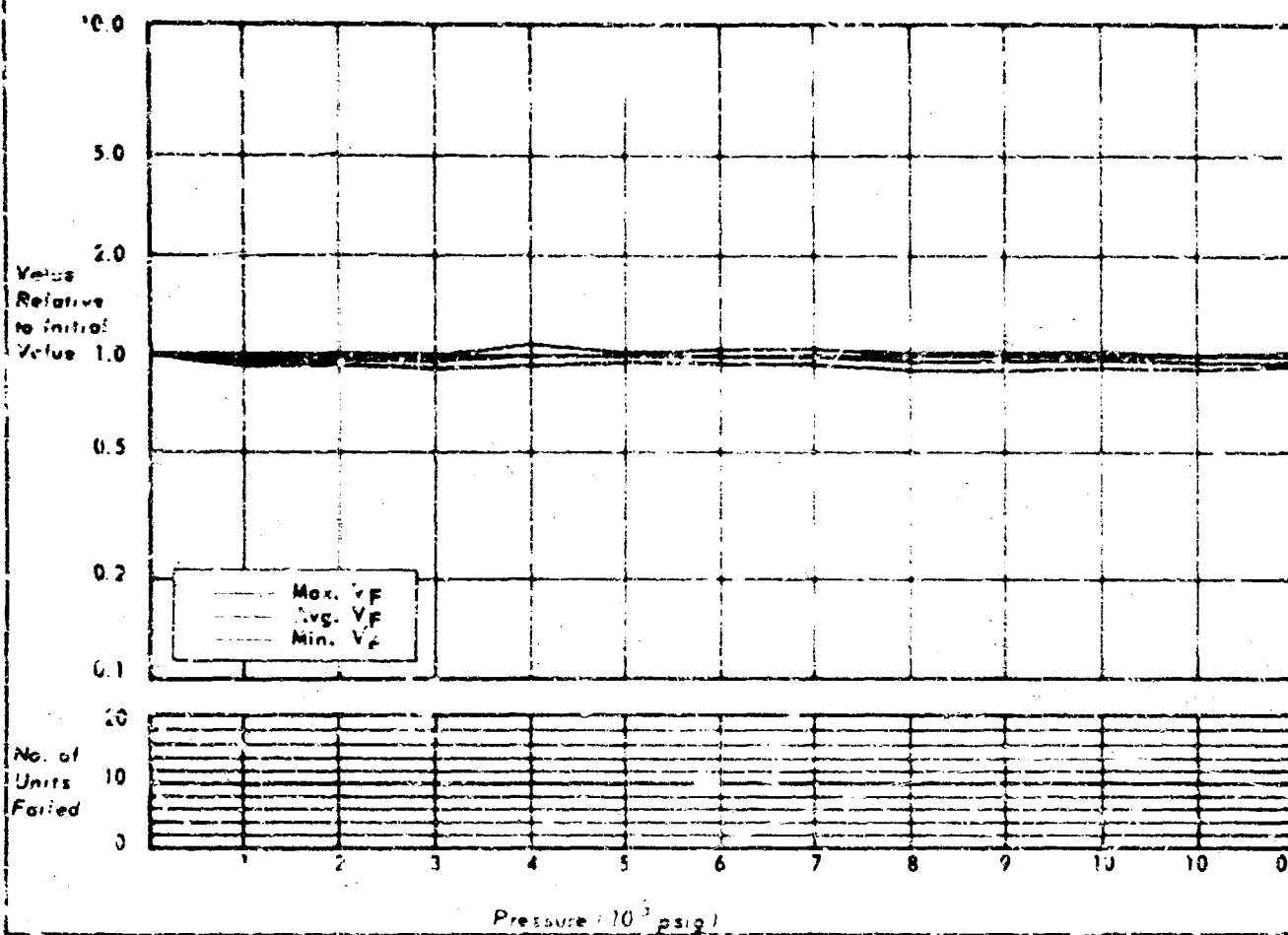
Motorola
1N 3191
Diode, rectifier

Herm sealed steel case
Tubular, axial lead
0.32 x 0.24" diam

SOAK PERIOD: 16 hours at 3,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.



Matrosia
1N 4005
Diode, rectifier

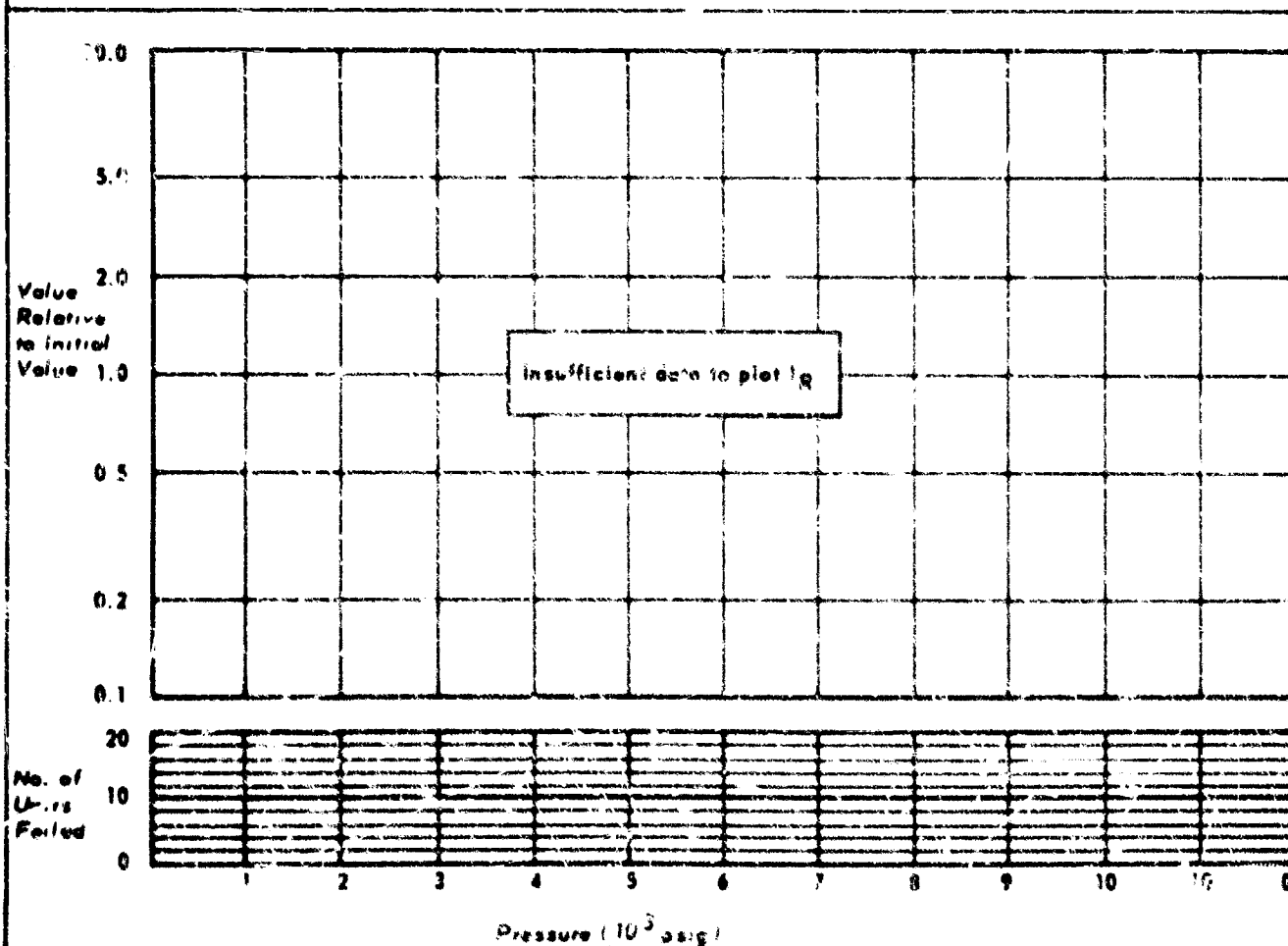
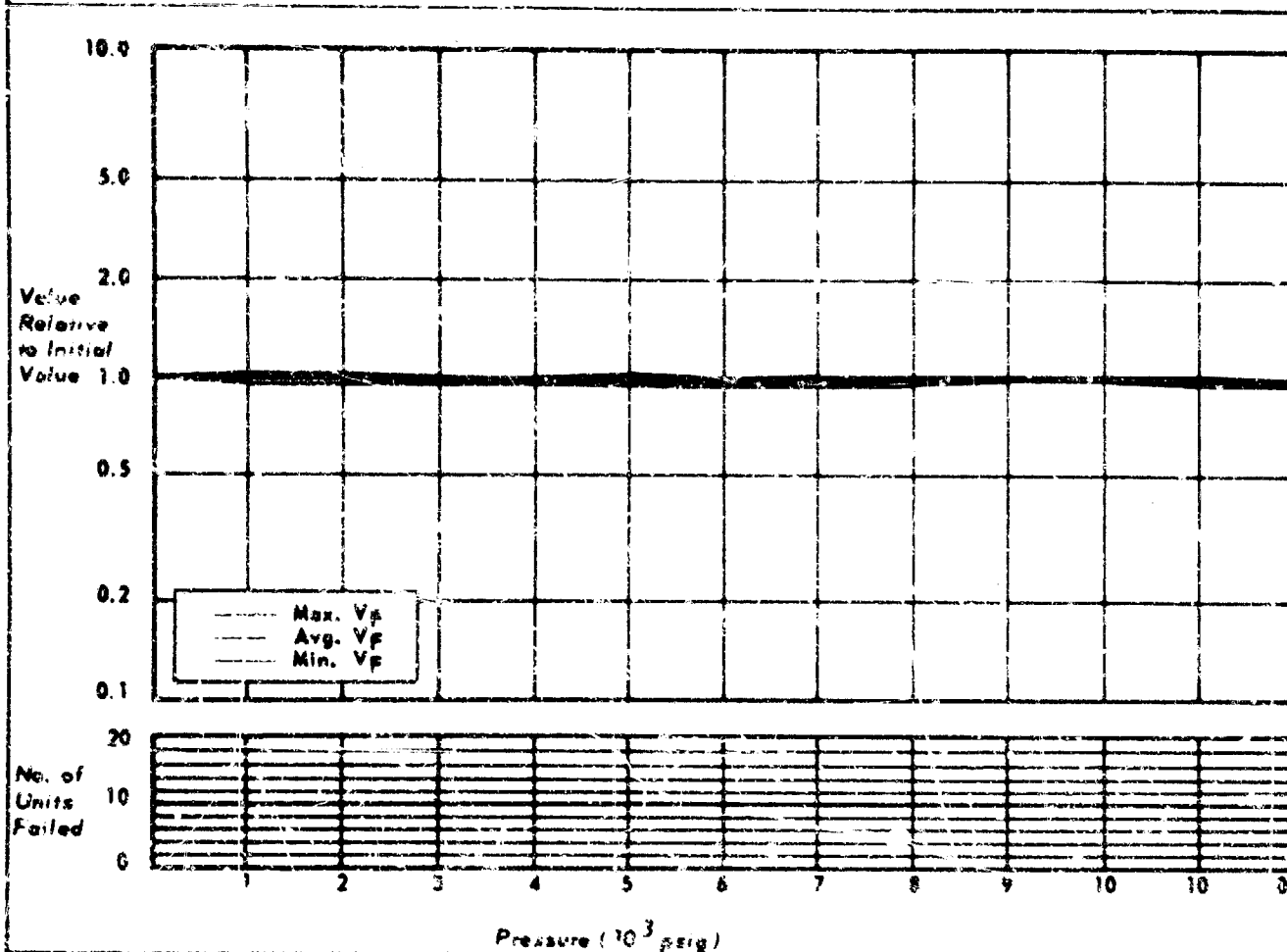
PIV = 500 V
 $i_{a \text{ avg.}} = 1 \text{ Amp}$

Plastic encap
Passivated
Tubular, axial lead
0.18 x 0.1" diam

SOAK PERIOD: None

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.



Motorola

$V_Z = 9.1 \text{ V}$

Hermetically sealed metal case

1N 3043B

$I_{ZT} = 2.8 \text{ mA}$

Tubular, axial lead

Diode, zener

0.31" x 0.22" diam

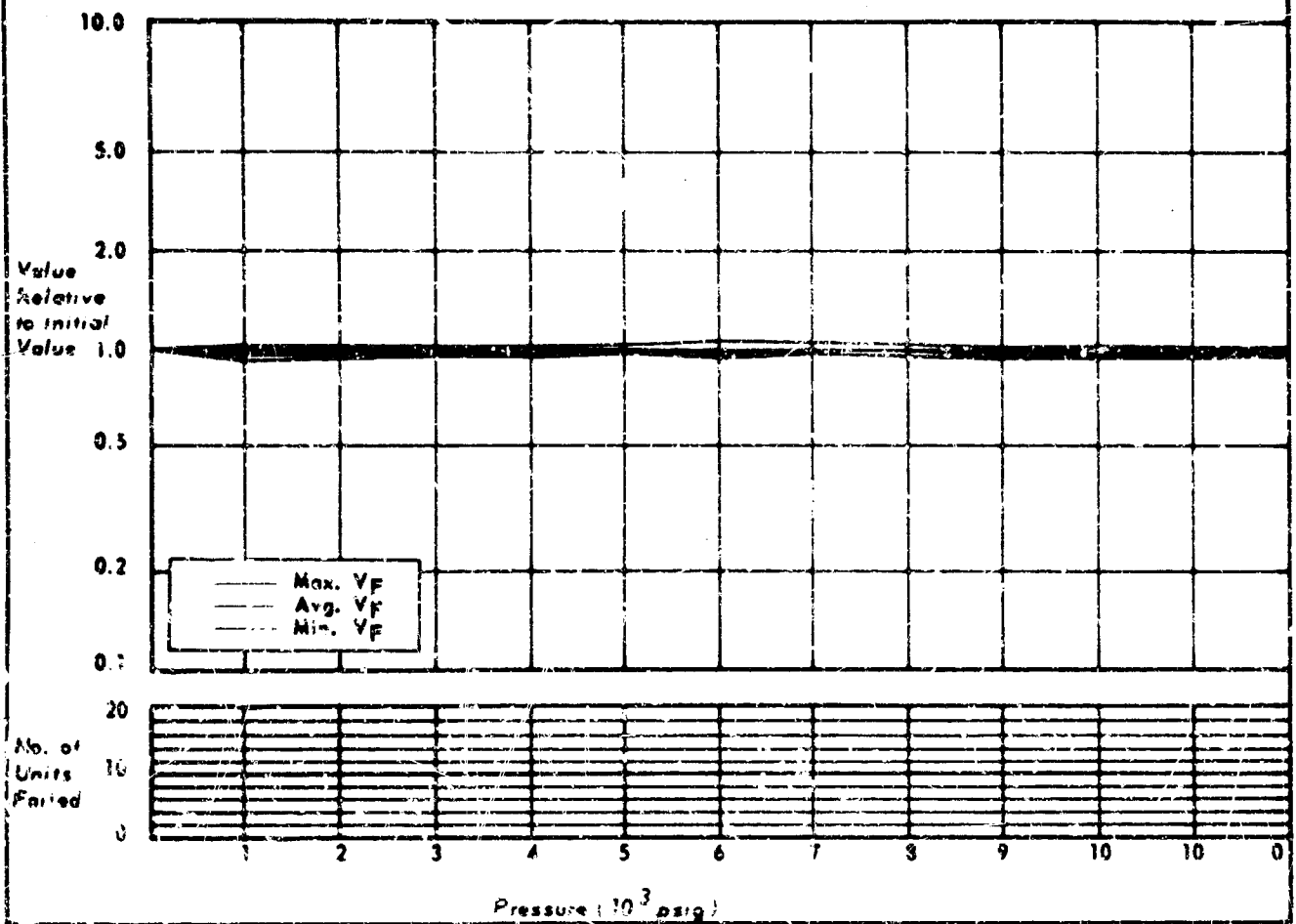
SOAK PERIOD: None

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

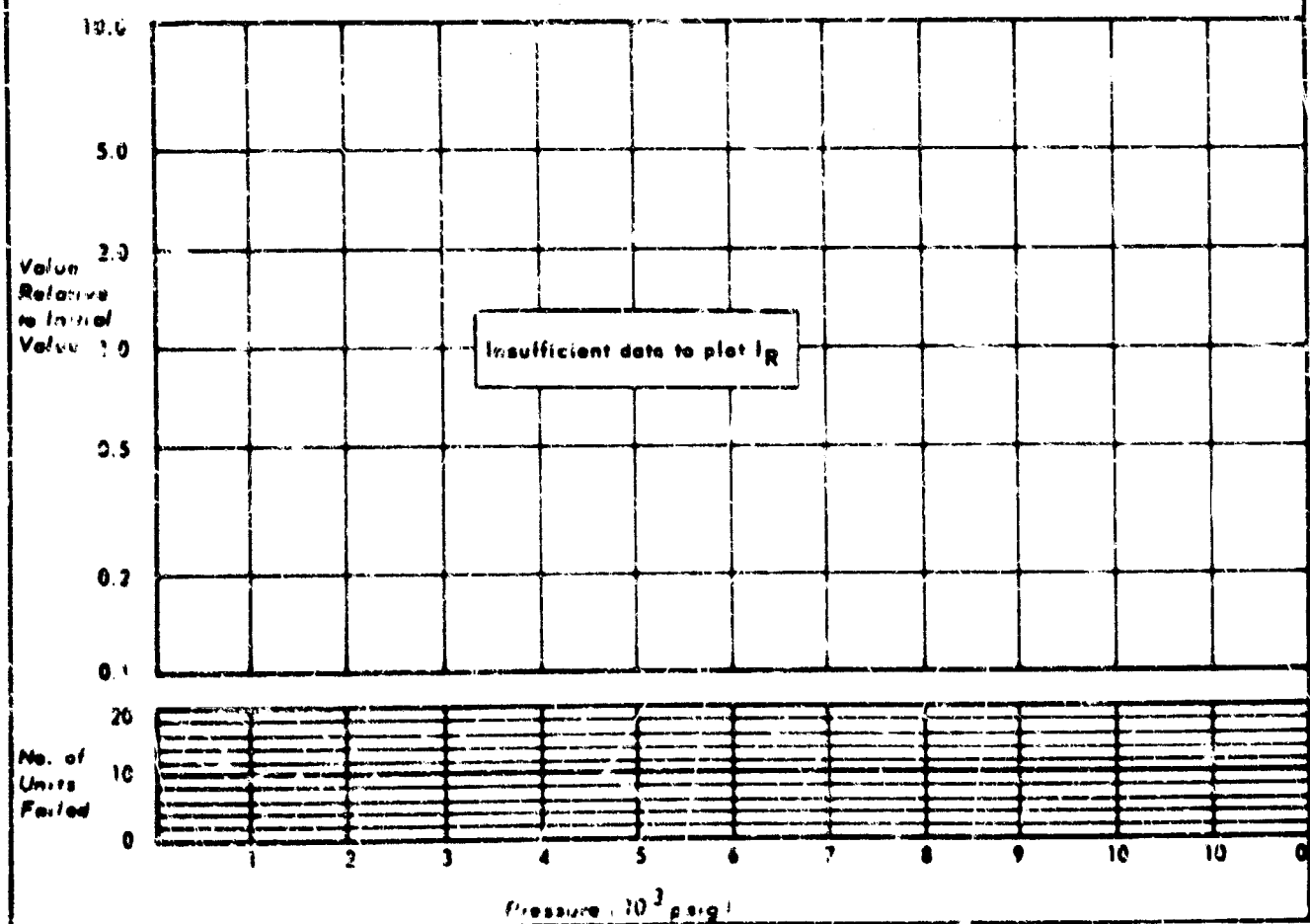
MFG. - MOTOROLA
 TYPE - DIODE, ZENER
 DESCRIPTION - 400MW

CHART NO. 77
 NO. OF SAMPLES TESTED - 18



MFG.
 TYPE
 DESCRIPTION

CHART NO. 77A
 NO. OF SAMPLES TESTED



Motorola

See Note #1

Glass, molded

Type 400, See note

Tubular, axial lead

Diodes, zeners

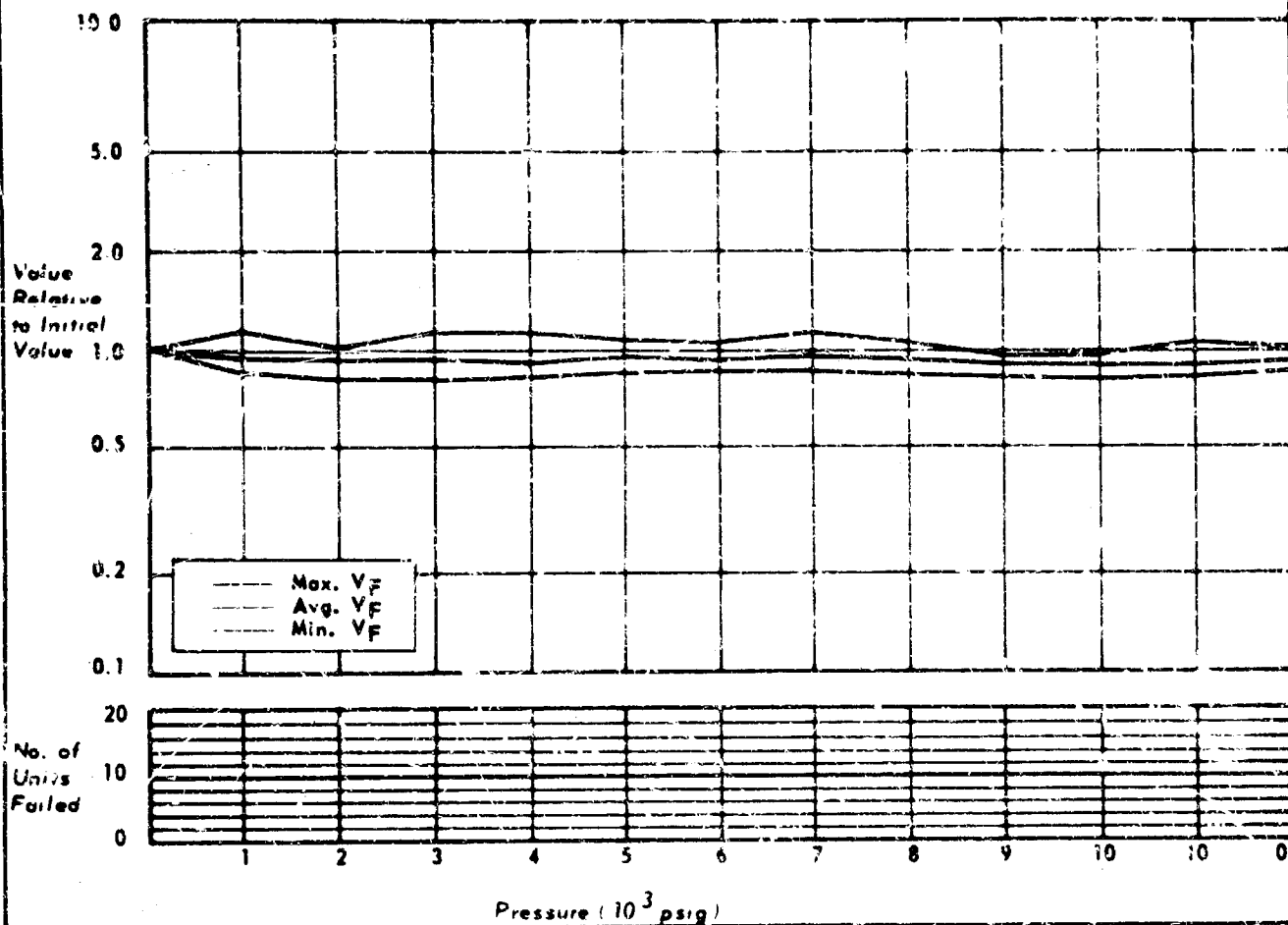
0.24 x 0.08" diam

SOAK PERIOD: 16 hours at 10,000 psig.

MECHANICAL: No apparent damage.

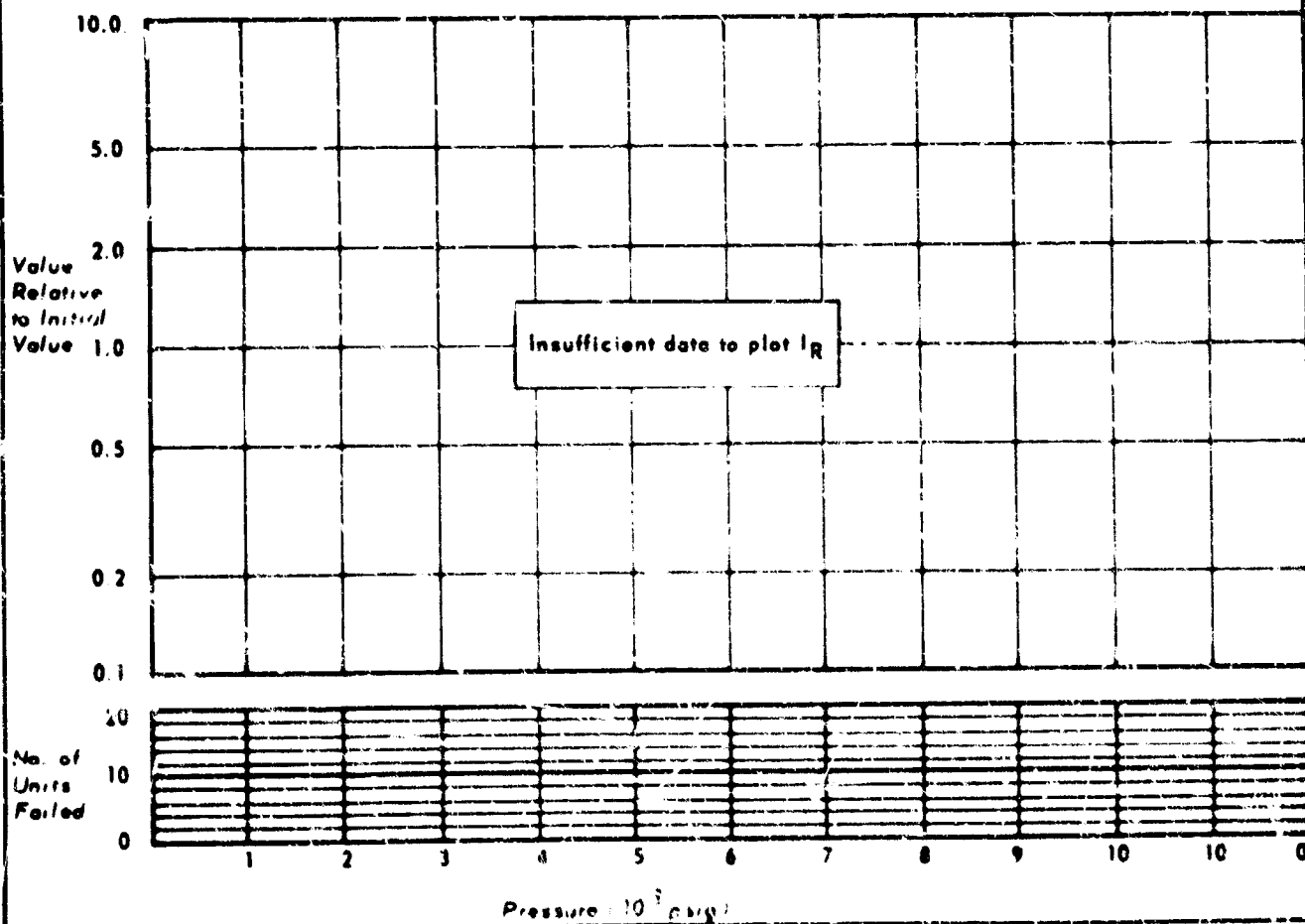
NOTE #1: Twenty components, two each of ten various values were submitted. Since all components were of the same type the set of twenty was tested and the results of the set graphed. The part numbers, description and components failed are listed below.

Part No.	P.V.	I _{dc} avg.	No. failed	Part No.	P.V.	I _{dc} avg.	No. failed
1N 746A	3.3 V	20 mA	0	1N 952A	14.0 V	11.5 mA	0
1N 749A	4.3 V	20 mA	0	1N 966B	16.0 V	7.8 mA	0
1N 741A	5.1 V	20 mA	0	1N 969B	22.0 V	5.6 mA	0
1N 755A	7.5 V	20 mA	0	1N 975B	35.0 V	3.2 mA	0
1N 759A	12.0 V	20 mA	0	1N 989B	91.0 V	1.4 mA	2



MFG.
 TYPE
 DESCRIPTION

CHART NO. 78A
 NO. OF SAMPLES TESTED



Ohmite

Diode

Silicon

Tubular, axial lead

0.26 x 0.09" diam

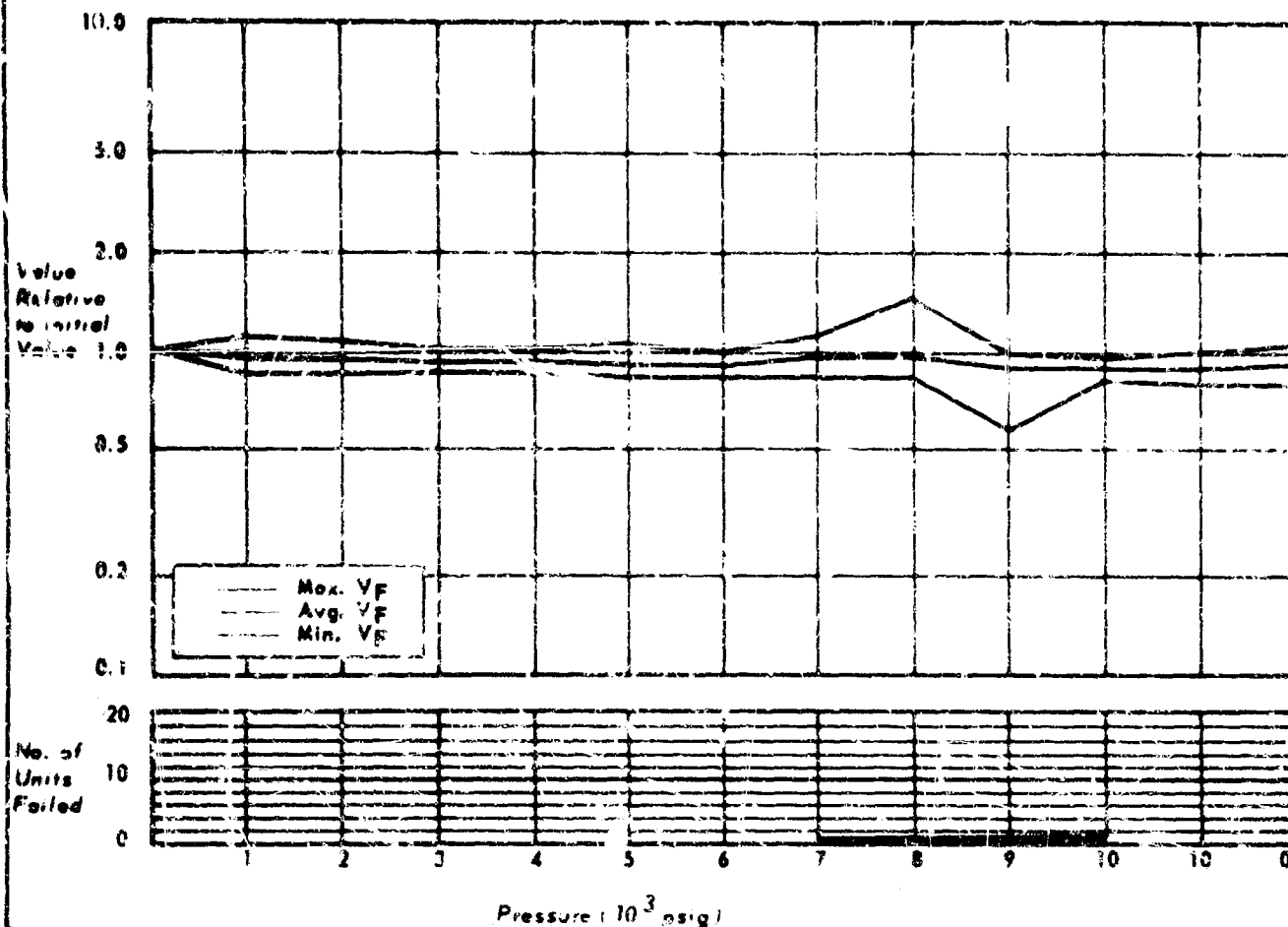
SOAK PERIOD: None

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

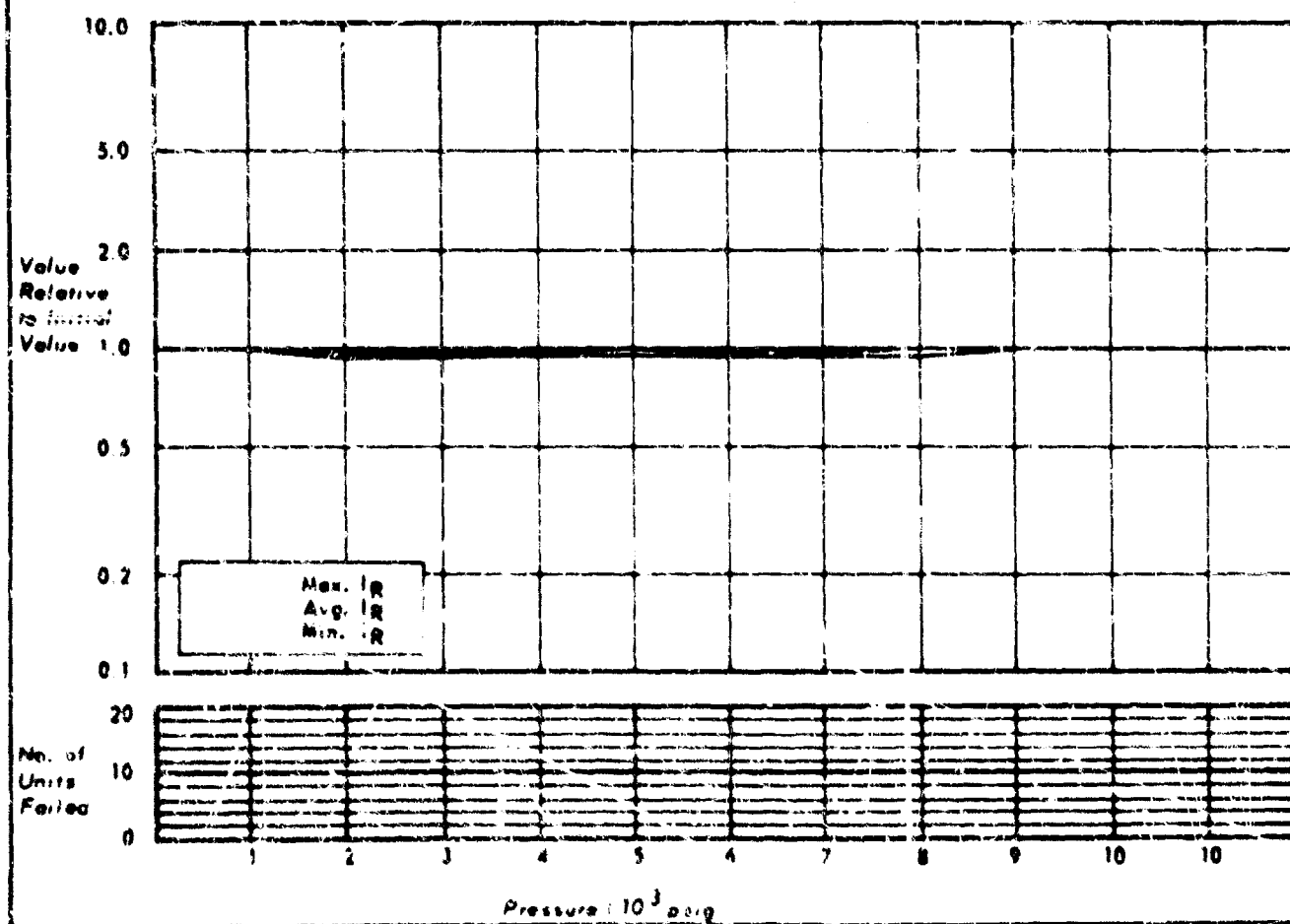
TYPE - SILICON DIODE (UNDER PRESSURE)
DESCRIPTION - (NONE AVAILABLE)

CHART NO. 76
NO. OF SAMPLES TESTED



MFG.
TYPE
DESCRIPTION - (SAME AS ABOVE)

CHART NO. 79A
NO. OF SAMPLES TESTED



Ohmite
Red dot
Diode

Silicone, pressurized units
Tubular, axial lead
0.26 x 0.18" diam

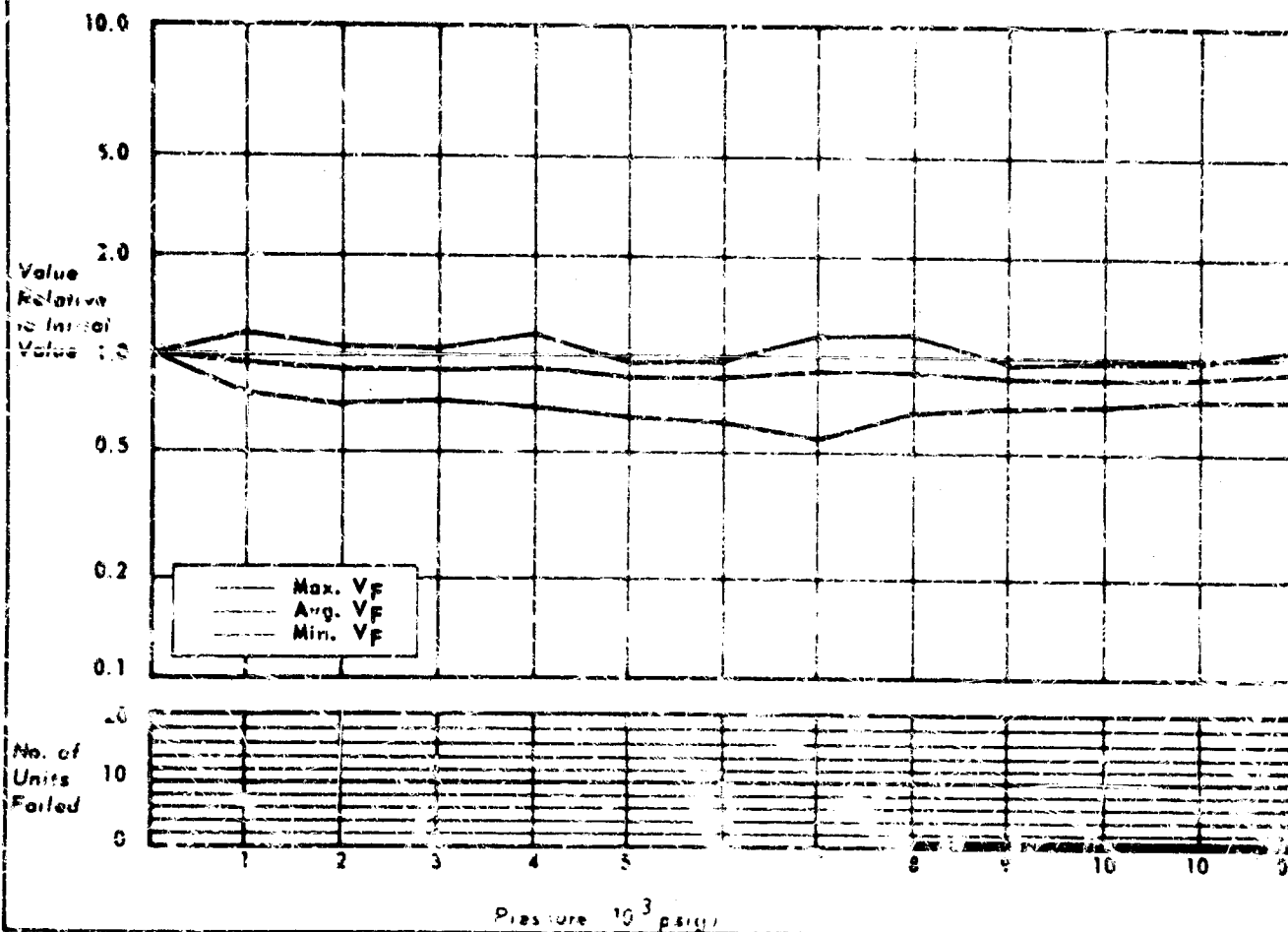
SOAK PERIOD: None

MECHANICAL: No apparent damage.

ELECTRICAL: Eleven components indicated less than 10% change.
Seven components indicated a change greater than 10% and less than 50%.
One component indicated a change greater than 50% with subsequent recovery at pressures shown on failure graph on opposite page.

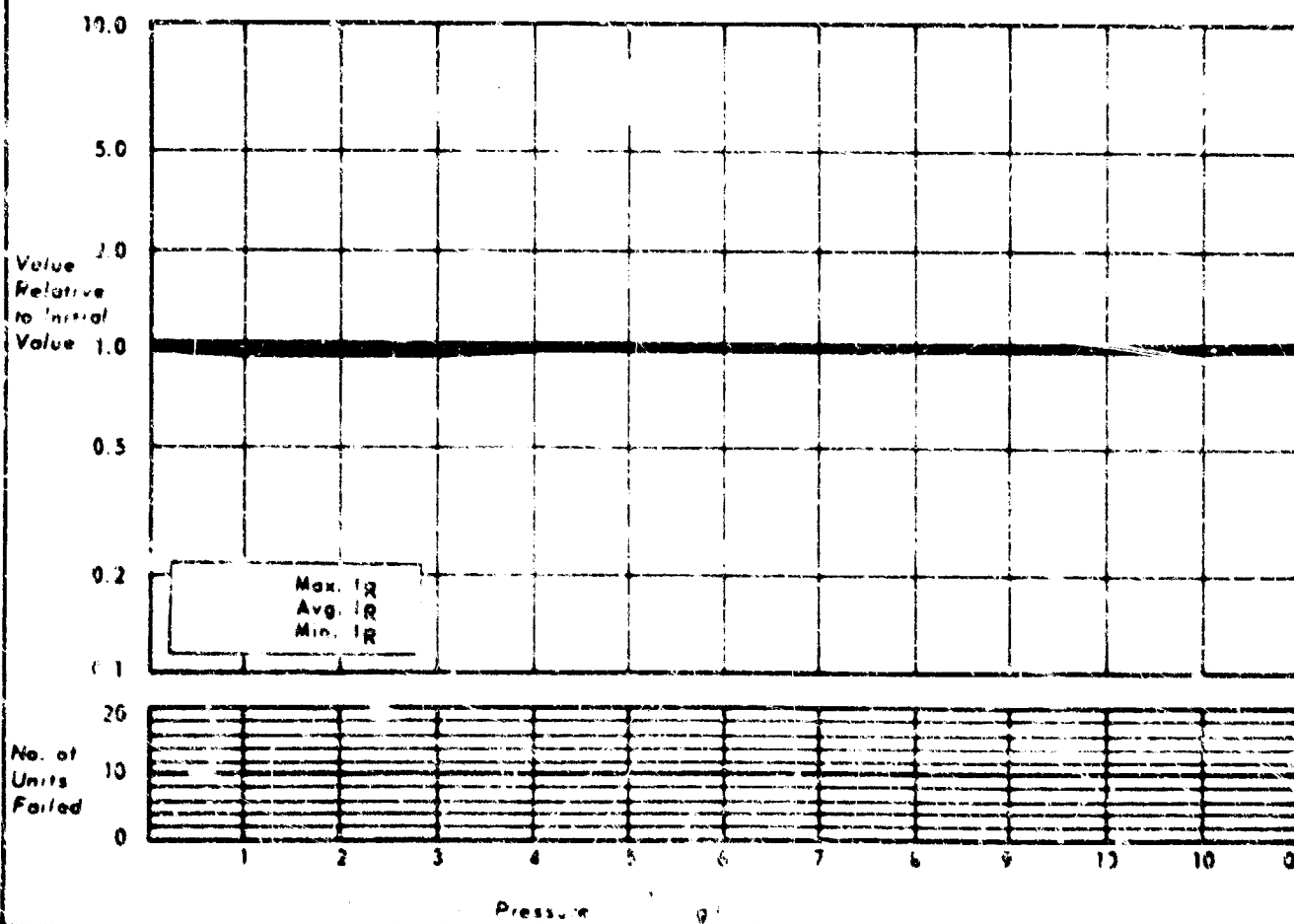
MFG. OMNITE
 TYPE GERMANIUM DIODE
 DESCRIPTION (NONE AVAILABLE)

CHART NO. 80
 NO. OF SAMPLES TESTED 100



MFG.
 TYPE
 DESCRIPTION (SAME AS ABOVE)

CHART NO. 80A
 NO. OF SAMPLES TESTED



Ohmite

Germanium, glass encap

Diode

Tubular, axial lead

0.26 x 0.06" diam

SOAK PERIOD: None

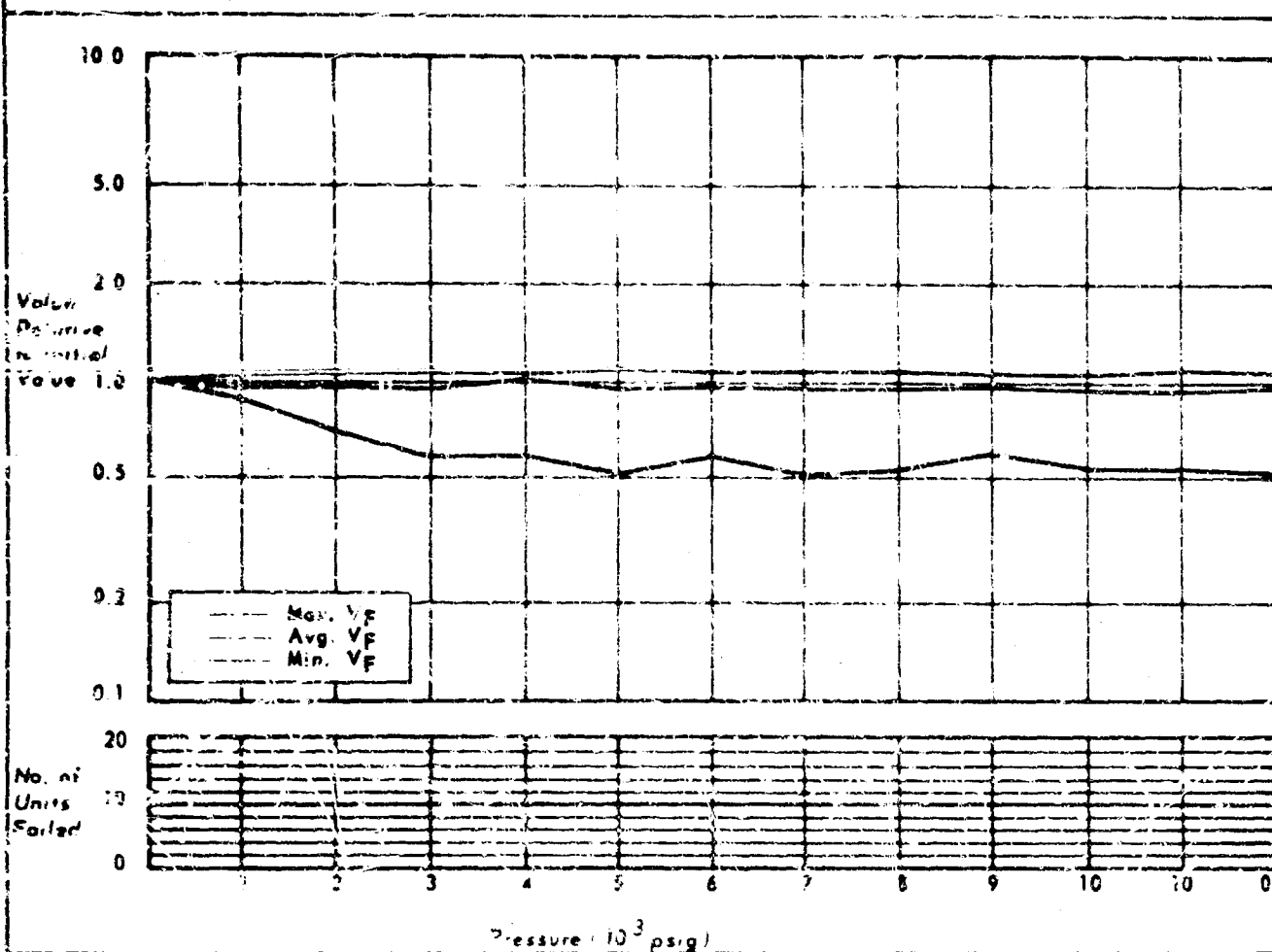
MECHANICAL: No apparent damage.

ELECTRICAL: Fourteen components indicated less than 10% change.
Four components indicated a change greater than 10% and less than 50%.

FAILURES: Two components indicated a permanent change greater than 50% at the pressures shown on the failure graph on opposite page.

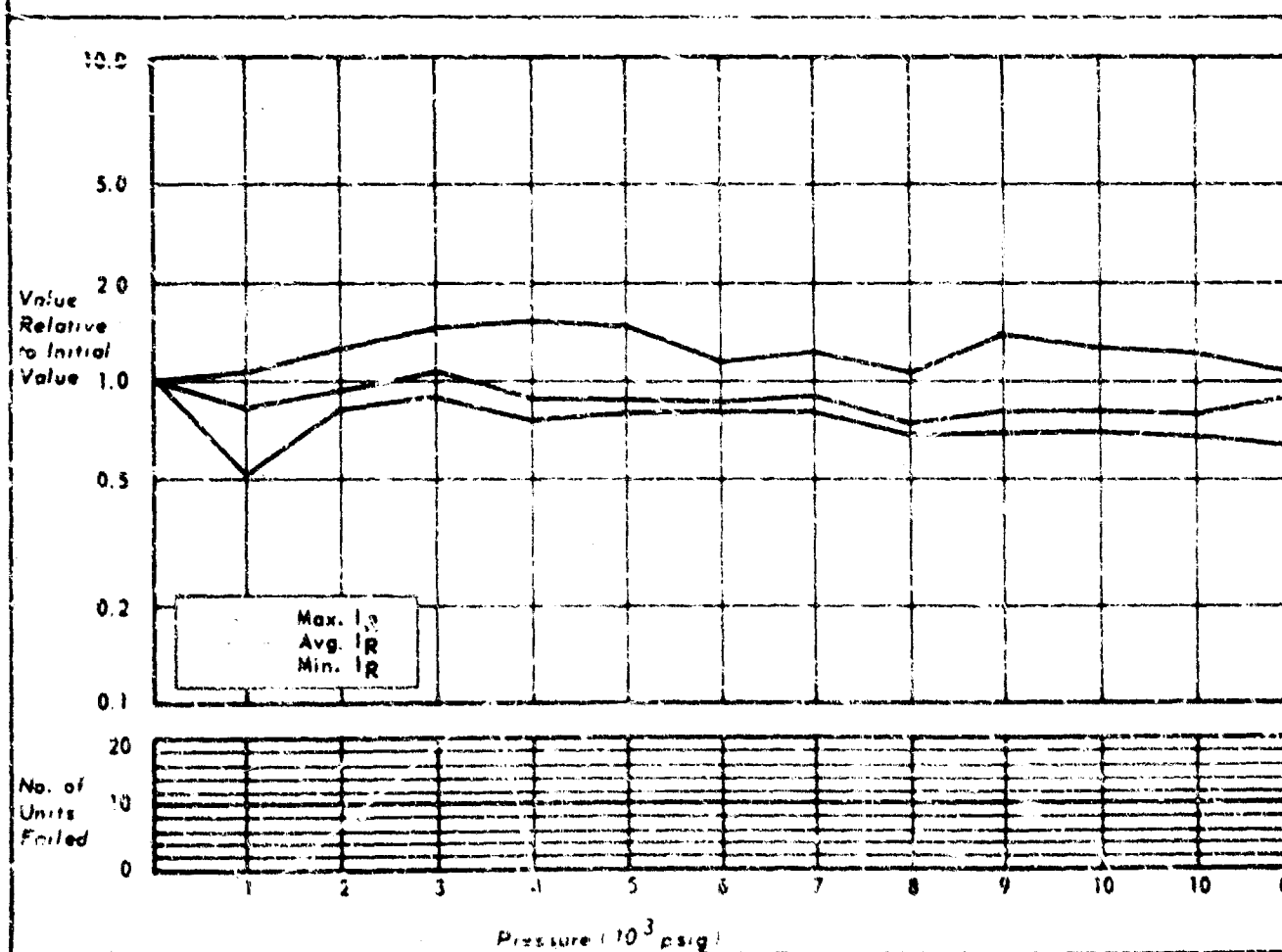
MFG. Sylvania
 TYPE D1NCE RECTIFIER
 DESCRIPTION 142089

CHART NO. 81
 NO. OF SAMPLES TESTED 19



MFG.
 TYPE
 DESCRIPTION (SAME AS ABOVE)

CHART NO. 81A
 NO. OF SAMPLES TESTED



Sylvania
1N 2069
Diode, rectifier

PIV = 200 V
I_{dc} avg. = 750 mA

Silicon
Epoxy, encaps
Bullet type

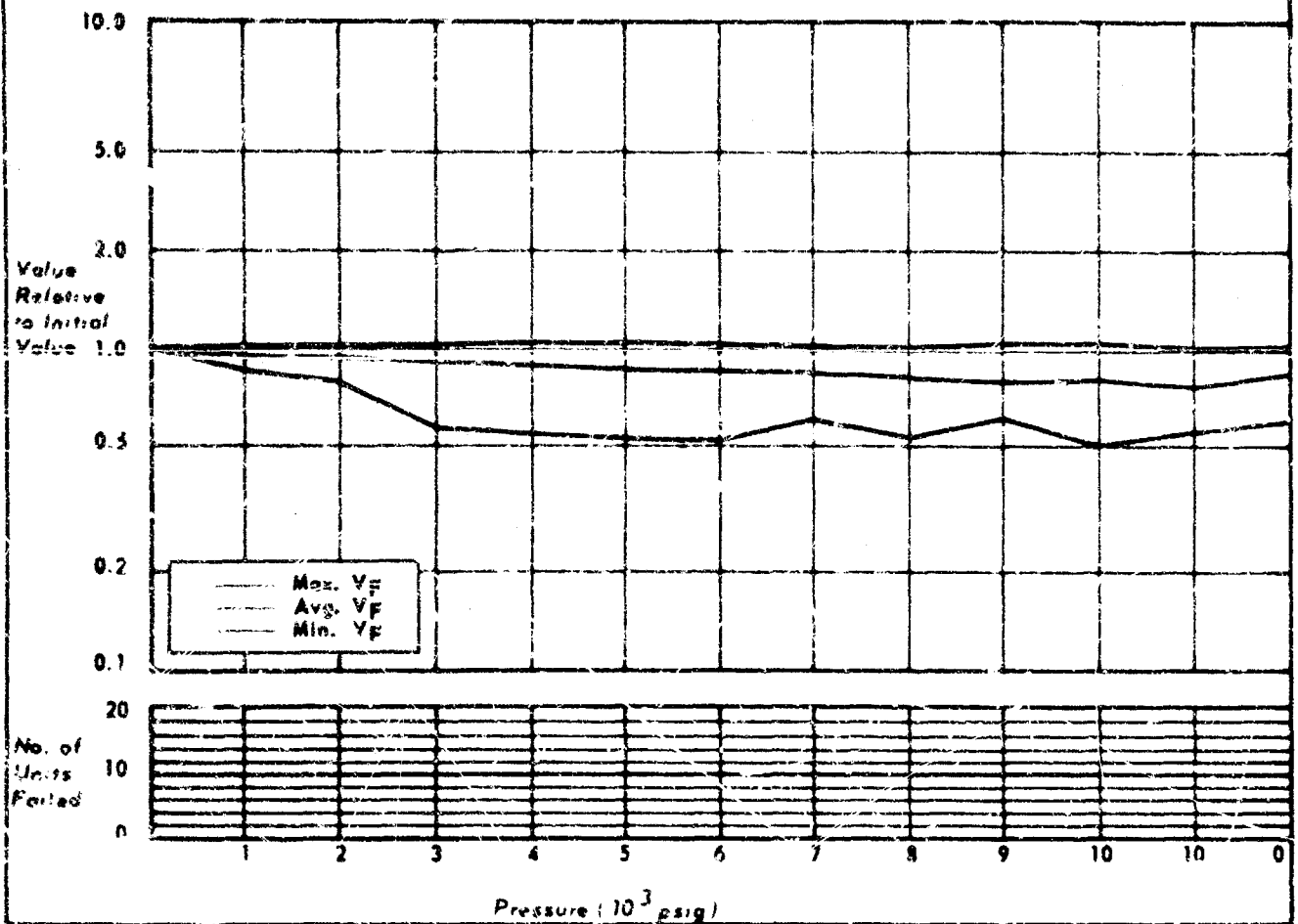
SOAK PERIOD: None

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 50% and greater than 10% change.

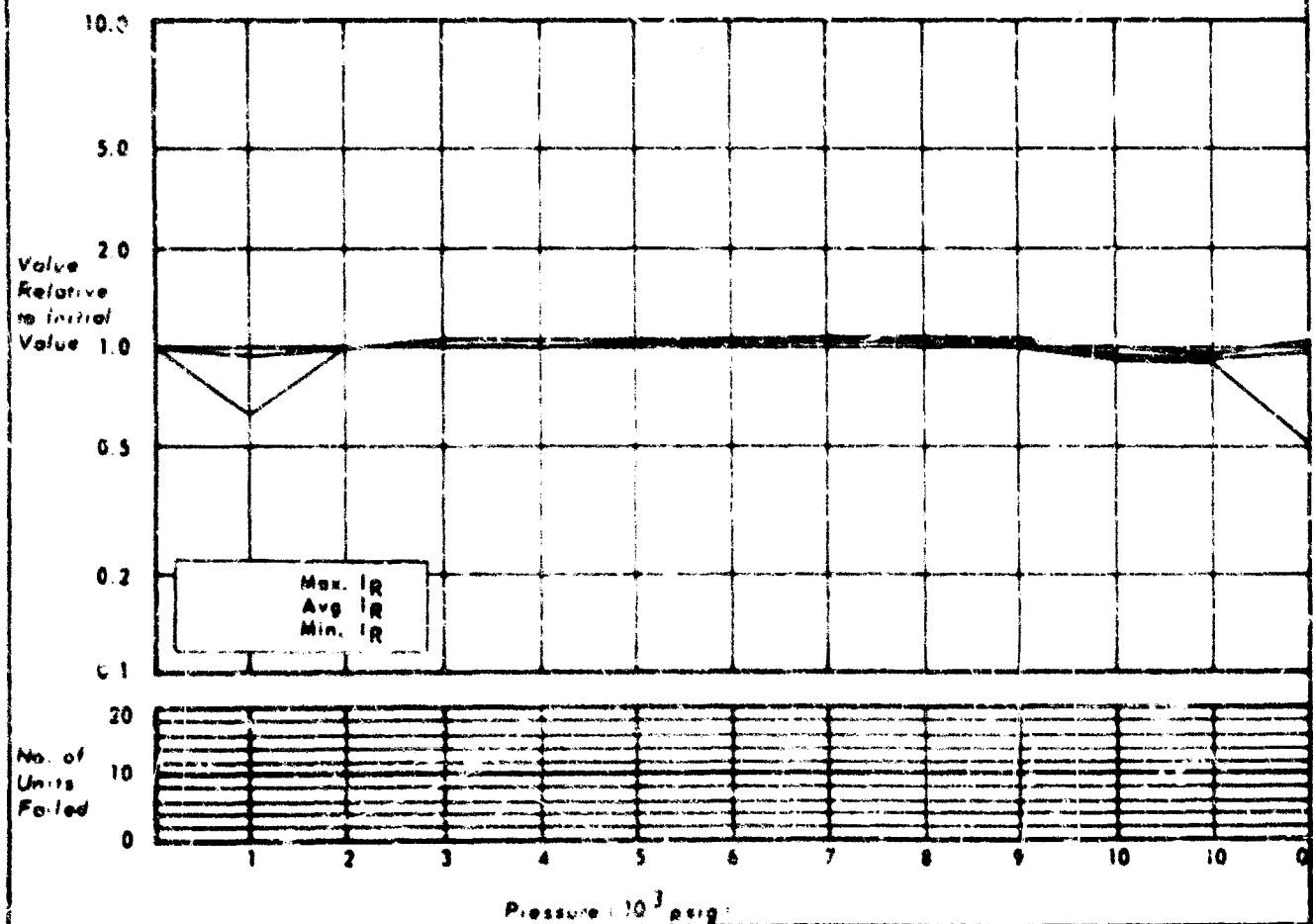
MFG. SYLVANIA
 TYPE DIODE
 DESCRIPTION 0*28

CHART NO. 82
 NO. OF SAMPLES TESTED - 17



MFG.
 TYPE
 DESCRIPTION (SAME AS ABOVE)

CHART NO. 82A
 NO. OF SAMPLES TESTED



Sylvania

DP 28

Diode, "whiskerless"

$V_F = 1.0 \text{ V @ } 10 \text{ mA}$

$I_R = 0.1 \mu\text{A @ } -20 \text{ V}_R$

Planar diffused

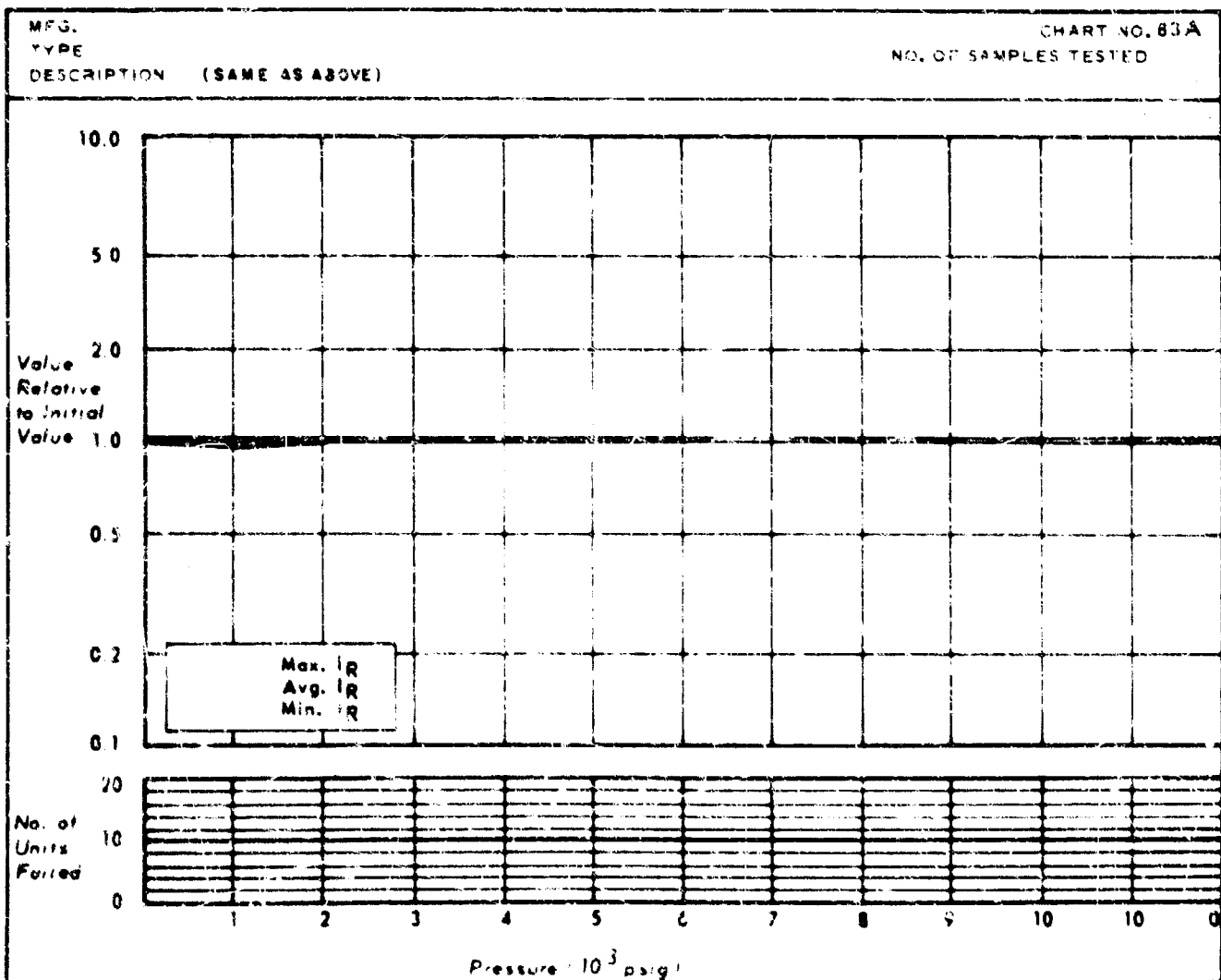
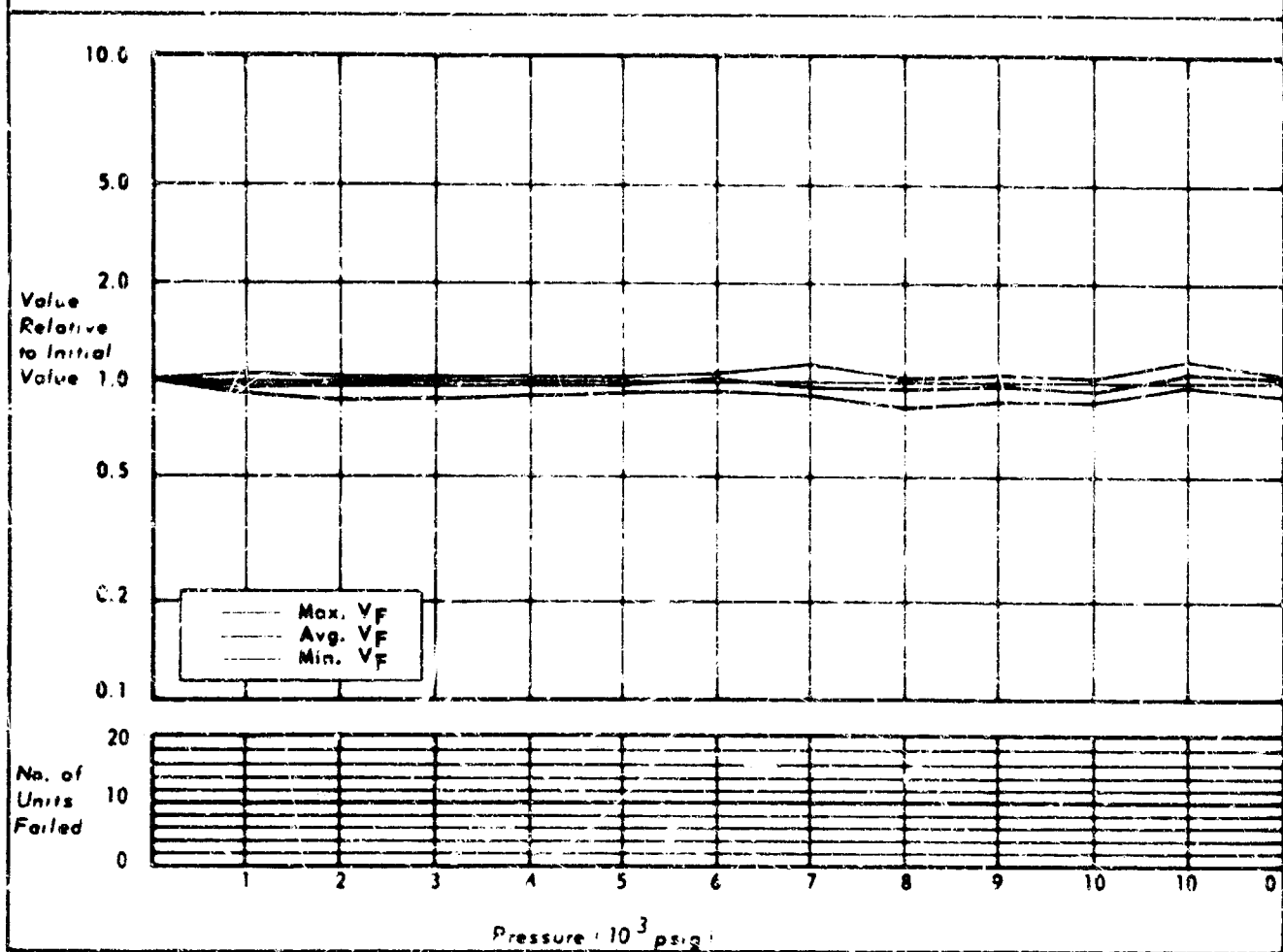
Passivated

Glass, metal seal

SOAK PERIOD: None

MECHANICAL: No apparent damage.

ELECTRICAL: Two components indicated less than 10% change. Fifteen components indicated greater than 10% and less than 50% change.



Texas Instrument

1N 251

Diode, computer

PIV = 30 V

$I_{dc \text{ avg.}} = 75 \text{ mA}$

Silicon, glass

Diffused, mesa

Tubular, axial lead

0.22 x 0.085" diam

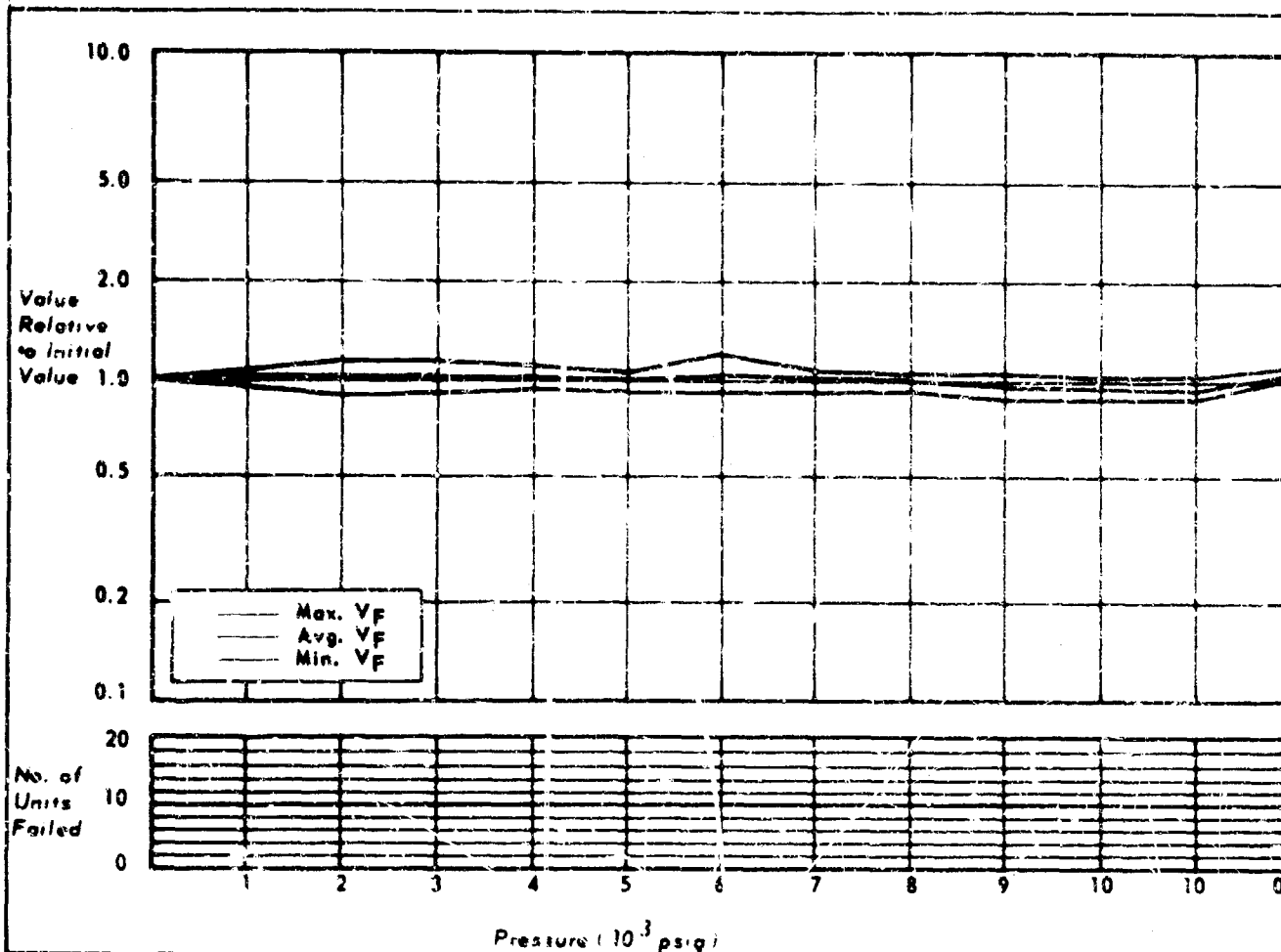
SOAK PERIOD: 16 hours at 10,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

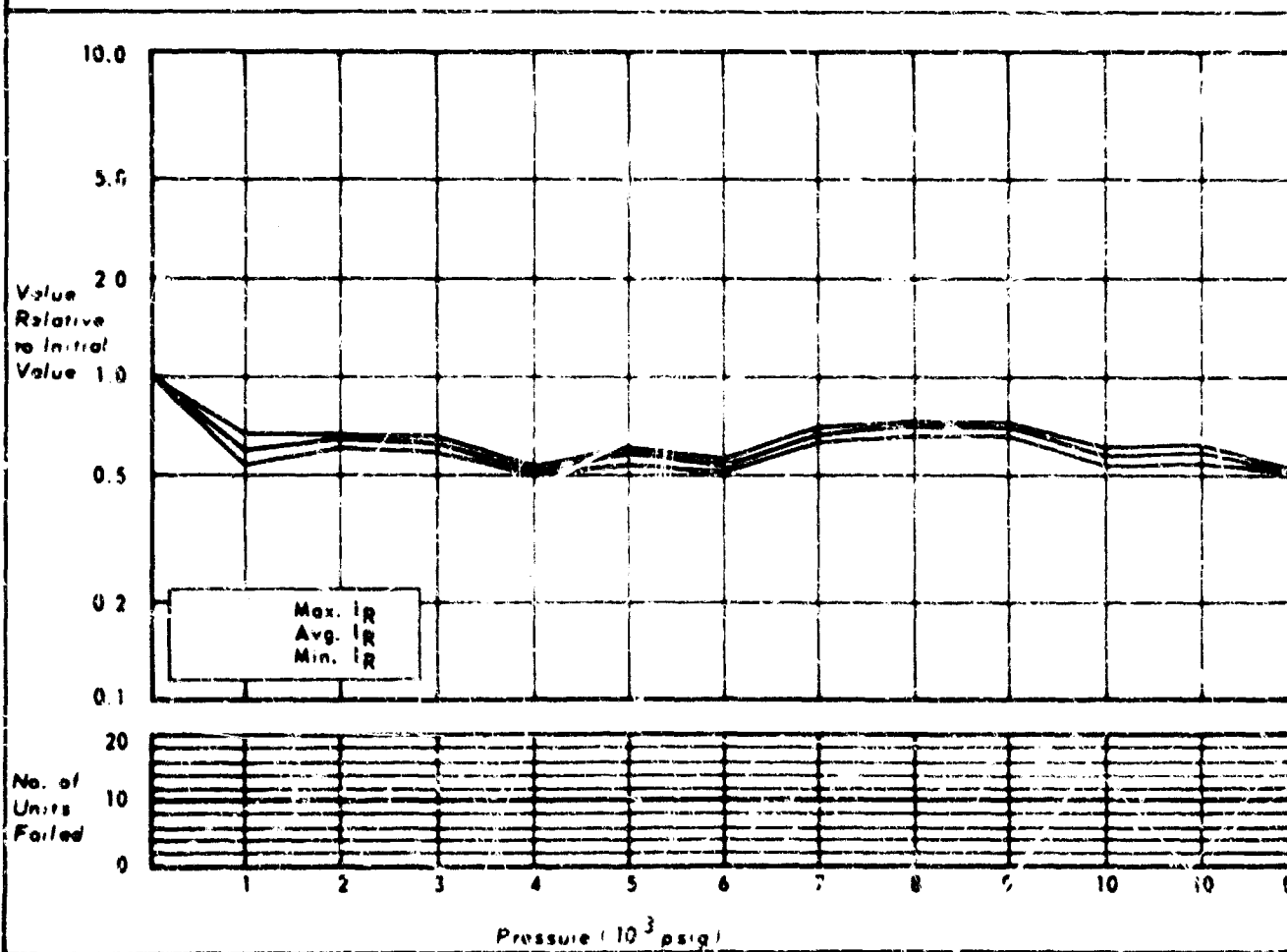
MFG. - TEXAS INSTRUMENT
 TYPE - DIODE
 DESCRIPTION - 1N645

CHART NO. 84
 NO. OF SAMPLES TESTED - 19



MFG.
 TYPE
 DESCRIPTION (SAME AS ABOVE)

CHART NO. 84A
 NO. OF SAMPLES TESTED



Texas Instrument
1N 645
Diode, general

PIV = 225 V
 $I_{dc \text{ avg.}} = 400 \text{ mA}$

Silicone, glass
Tubular, axial lead
0.3 x 0.02" diam

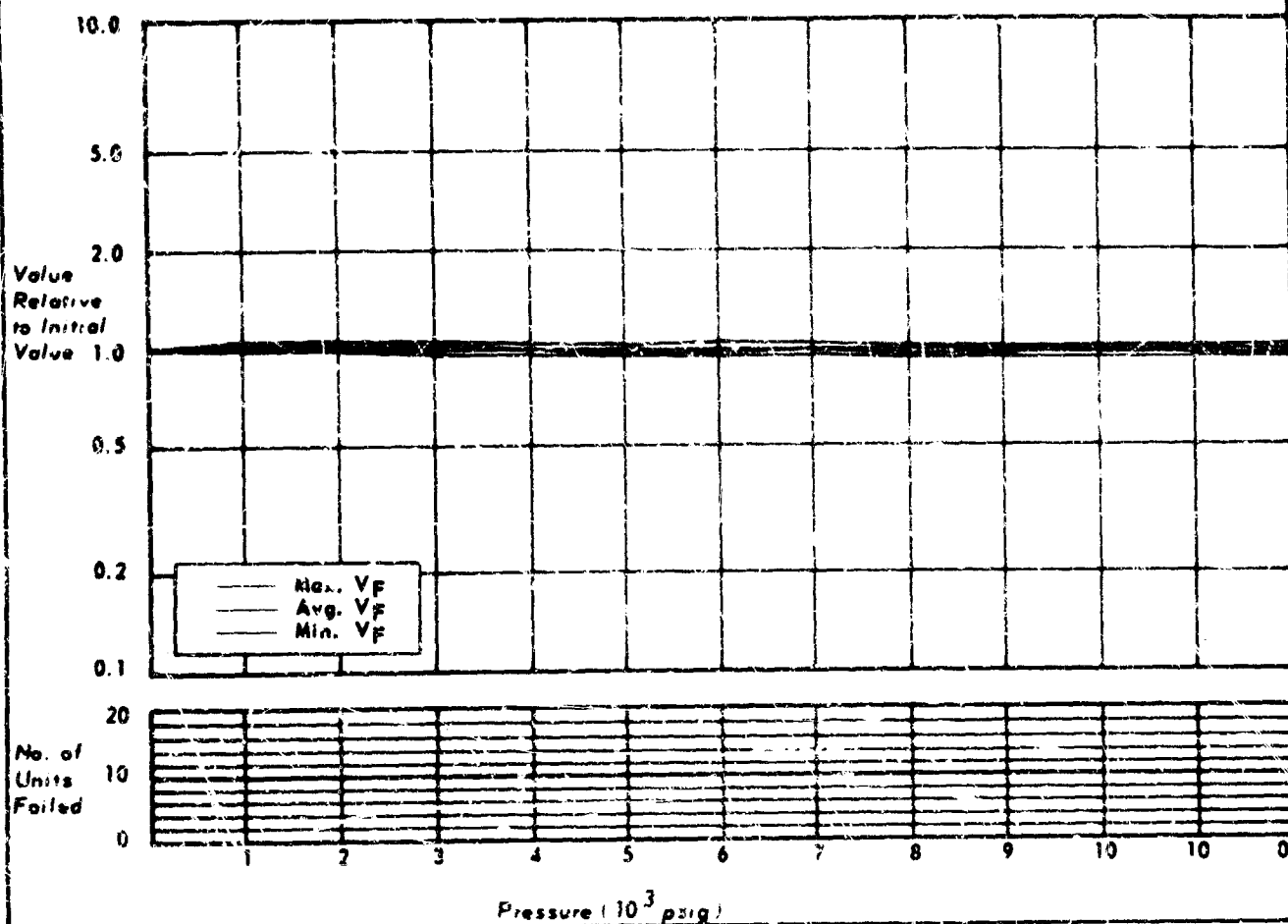
SOAK PERIOD: 16 hours at 10,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

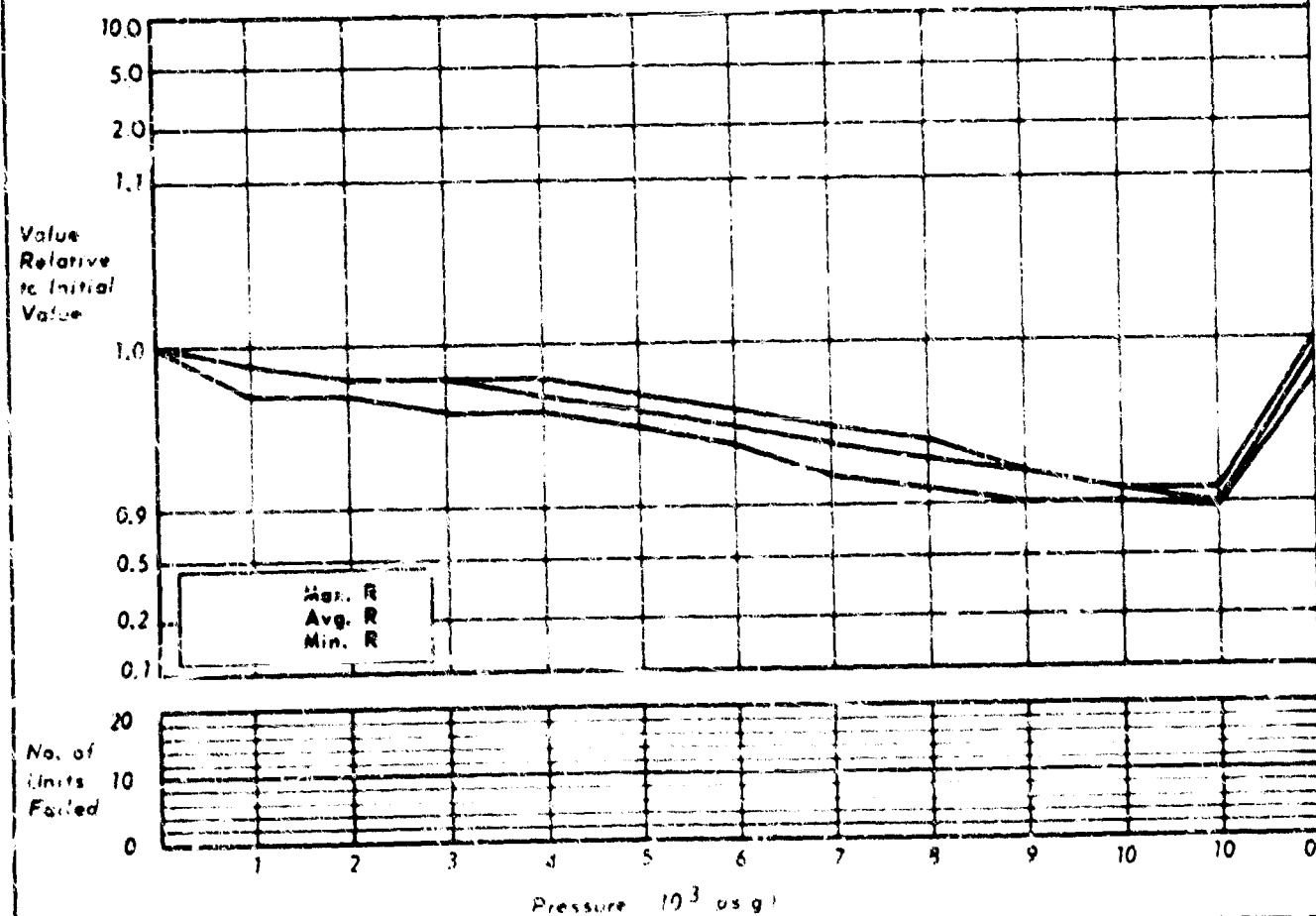
MFG.-TEXAS INSTRUMENT
 TYPE-D1007
 DESCRIPTION-IN751

CHART NO. 85
 NO. OF SAMPLES TESTED-20



MFG.-ALLEN BRADLEY
 TYPE-RESISTOR
 DESCRIPTION-88 1015

CHART NO. 86
 NO. OF SAMPLES TESTED-20



Texas Instruments

1N 751

Diode

$V_Z = 3.1 \text{ V}$

$P = 400 \text{ mW @ } 25^\circ\text{C}$

Silicon, glass encaps

Tubular, axial lead

0.3 x 0.02" diam

SOAK PERIOD: None

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

Allen-Bradley

BB 1015

Resistor

$100 \Omega \pm 5\%$

3.54 V max

0.125 W

Composition

Tubular, axial lead

0.145 x 0.062" diam

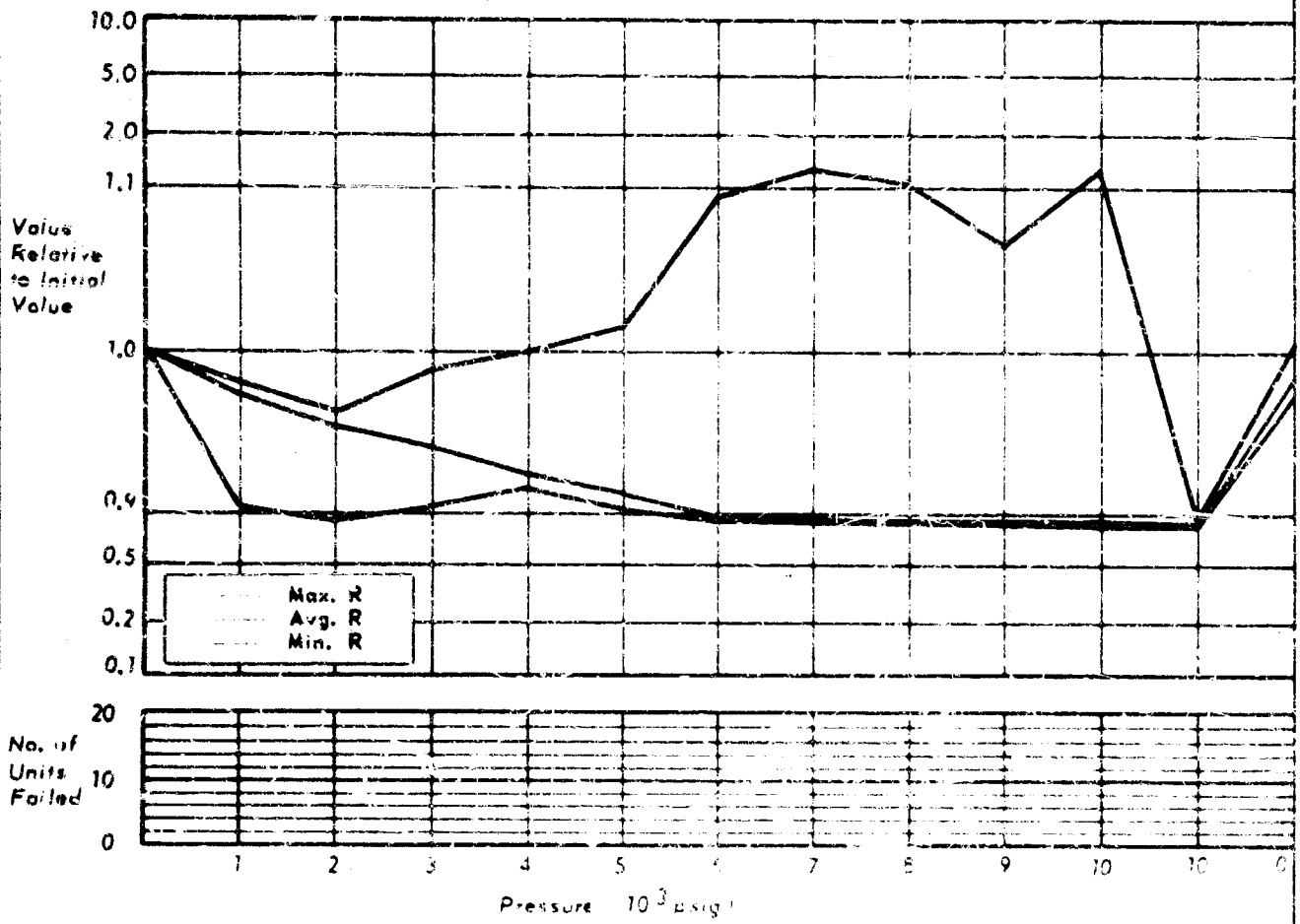
SOAK PERIOD: 15.5 hours at 10,000 psi.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

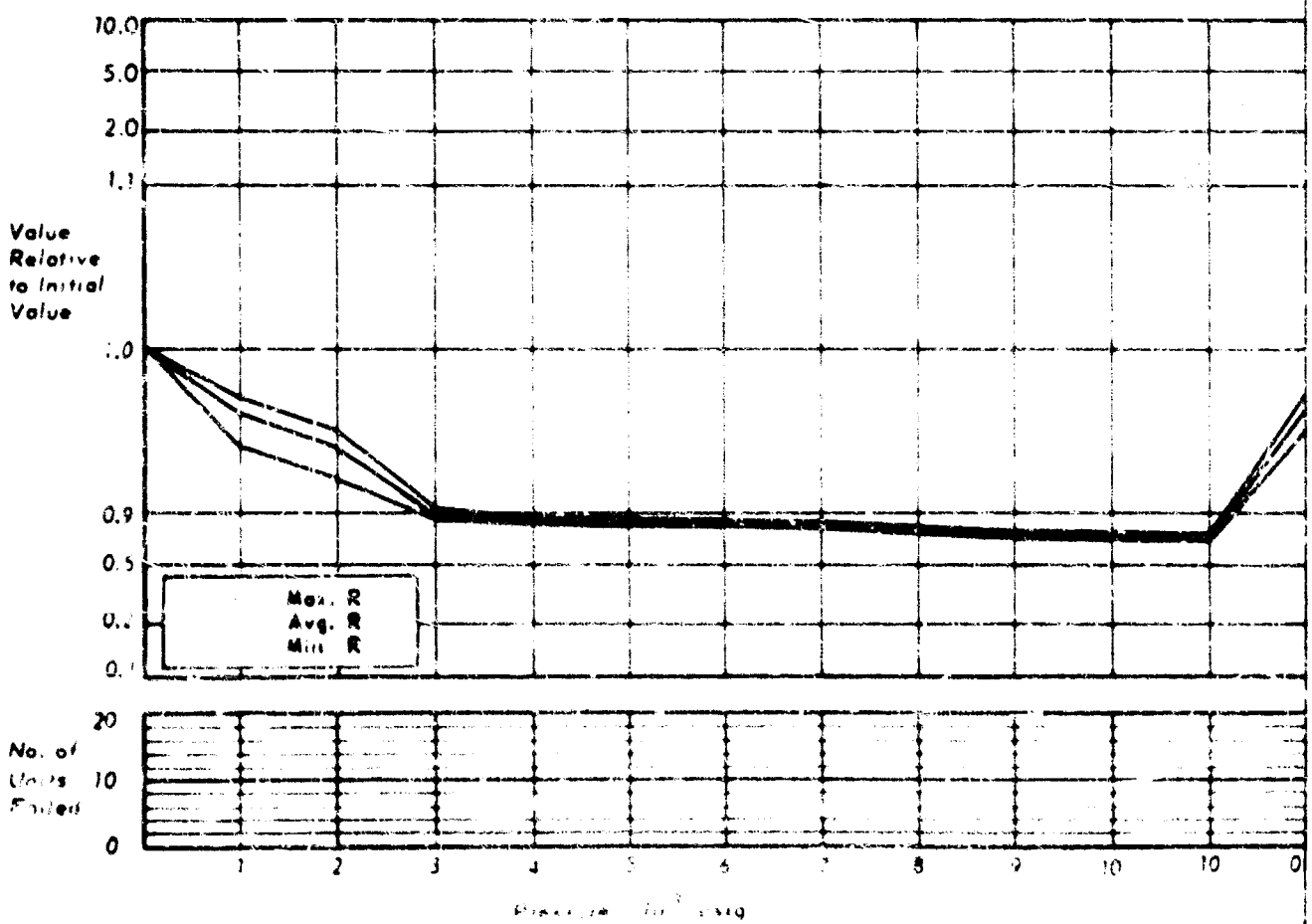
MFG. ALLEN BRADLEY
 TYPE RESISTOR
 DESCRIPTION 88-1035

CHART NO. 87
 NO. OF SAMPLES TESTED 20



MFG. ALLEN BRADLEY
 TYPE RESISTOR
 DESCRIPTION 88-1035

CHART NO. 88
 NO. OF SAMPLES TESTED 18



Allen-Bradley

10 K Ω $\pm$ 5%

Composition

BB 1035

35.36 Ω max

Tubular, axial lead

Resistor

0.125 W

0.145 x 0.062" diam.

SOAK PERIOD: 15.5 hours at 10,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated a change greater than 10% and less than 50%.

Allen-Bradley

1.0 M Ω $\pm$ 5%

Composition

BR 1055

150.00 V max

Tubular, axial lead

Resistor

0.145 x 0.062" diam.

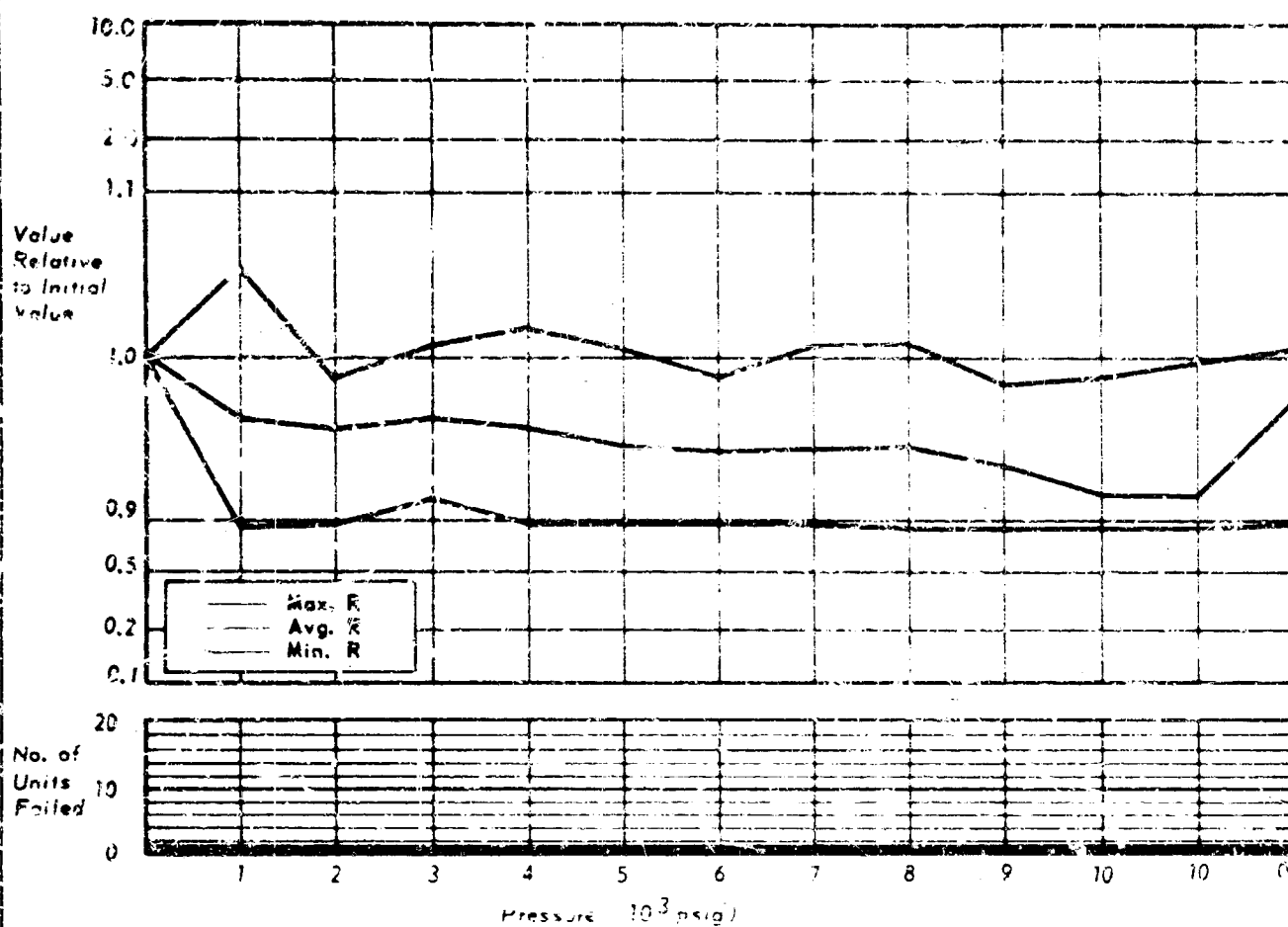
SOAK PERIOD: 15.5 hours at 10,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated a change greater than 10% with subsequent recovery to less than 10% change on return to 0 psig.

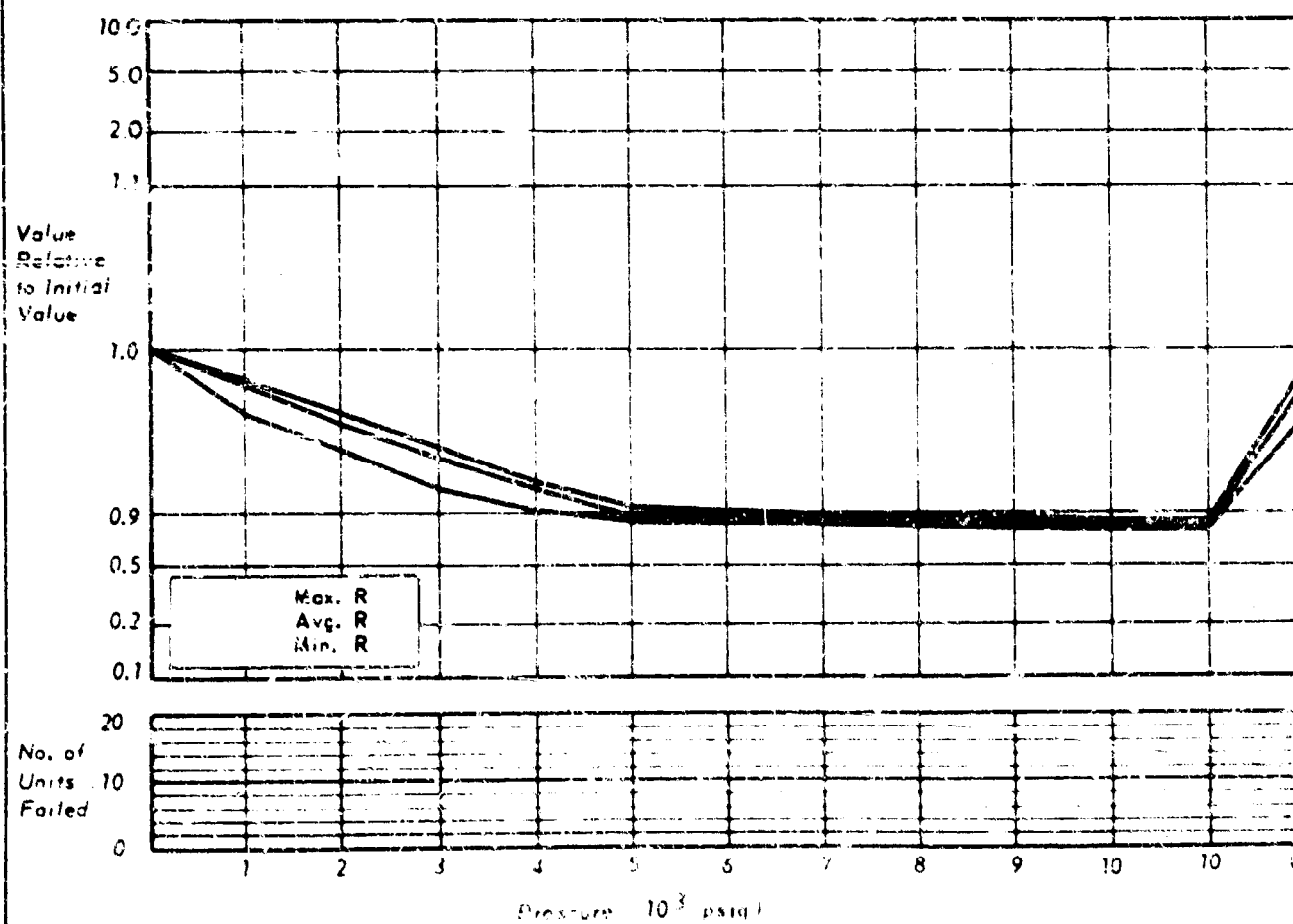
MFG.-ALLEN BRADLEY
TYPE - RESISTOR
DESCRIPTION - CB-1005

CHART NO. 89
NO. OF SAMPLES TESTED - 19



MFG.-ALLEN BRADLEY
TYPE - RESISTOR
DESCRIPTION - CB-1035

CHART NO. 90
NO. OF SAMPLES TESTED - 20



Allen-Bradley	$10 \Omega \pm 5\%$	Composition
CB 1005	1.58 V max	Tubular, axial lead
Resistor	0.25 W	0.25 x 0.09" diam.

SOAK PERIOD: None

MECHANICAL: No apparent damage.

ELECTRICAL: One component indicated a change greater than 10% and less than 50%.
Eighteen components indicated less than 10% change.

FAILURES: One component indicated a change greater than 50% with subsequent recovery at pressures shown on failure graph on opposite page.

Allen-Bradley	$10 K \Omega \pm 5\%$	Composition
CB 1035	50.0 V max	Tubular, axial lead
Resistor	0.25 V max	0.25 x 0.09" diam.

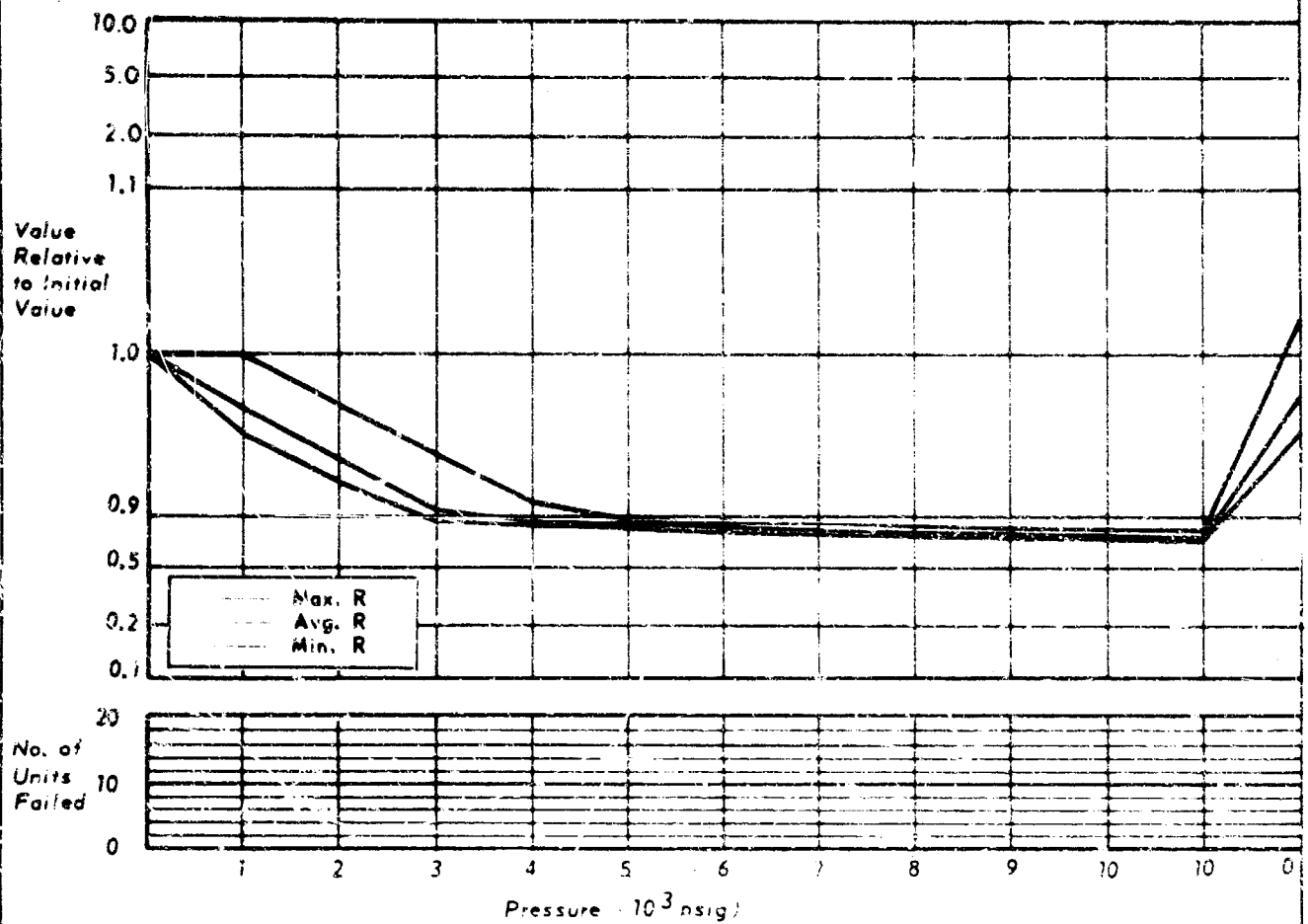
SOAK PERIOD: None

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated a change greater than 10% with subsequent recovery to less than 10% change on return to 0 psig.

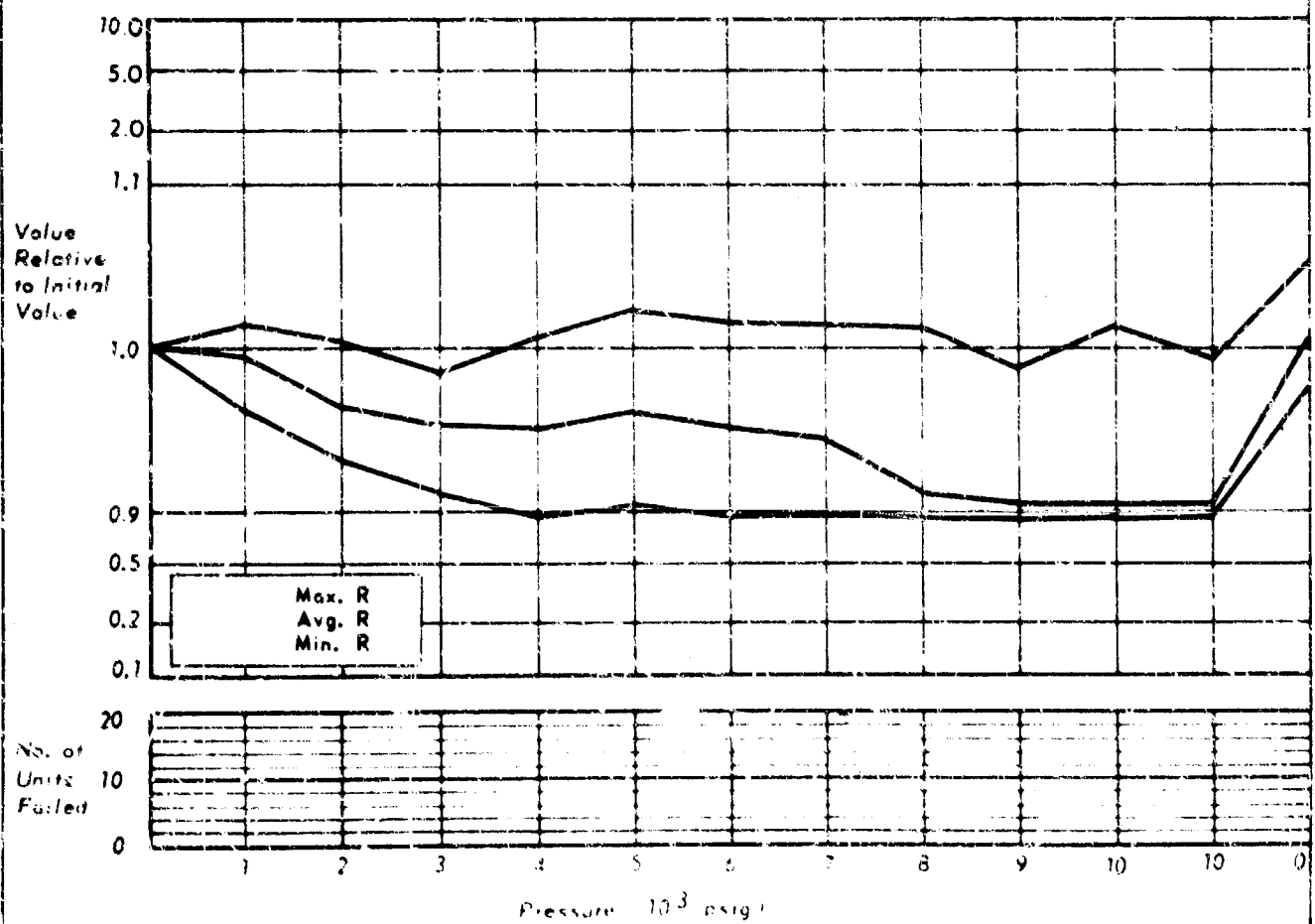
MFG. - ALLEN BRADLEY
 TYPE - RESISTOR
 DESCRIPTION - CB-1085

CHART NO. 91
 NO. OF SAMPLES TESTED - 20



MFG. - ALLEN BRADLEY
 TYPE - RESISTOR
 DESCRIPTION - EB-1005

CHART NO. 92
 NO. OF SAMPLES TESTED - 19



Allen-Bradley

CB 1055

Resistor

$1.0\text{ M}\Omega \pm 5\%$

250.0 V max

Composition

Tubular, axial lead

0.375 x 0.14" diam.

SOAK PERIOD: None

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated a change greater than 10% with subsequent recovery to less than 10% change on return to 0 psig.

Allen-Bradley

EB 1005

Resistor

$10\ \Omega \pm 5\%$

2.23 V max

0.5 W

Composition

Tubular, axial lead

0.375 x 0.14" diam.

SOAK PERIOD: 16 hours at 7,000 psig.

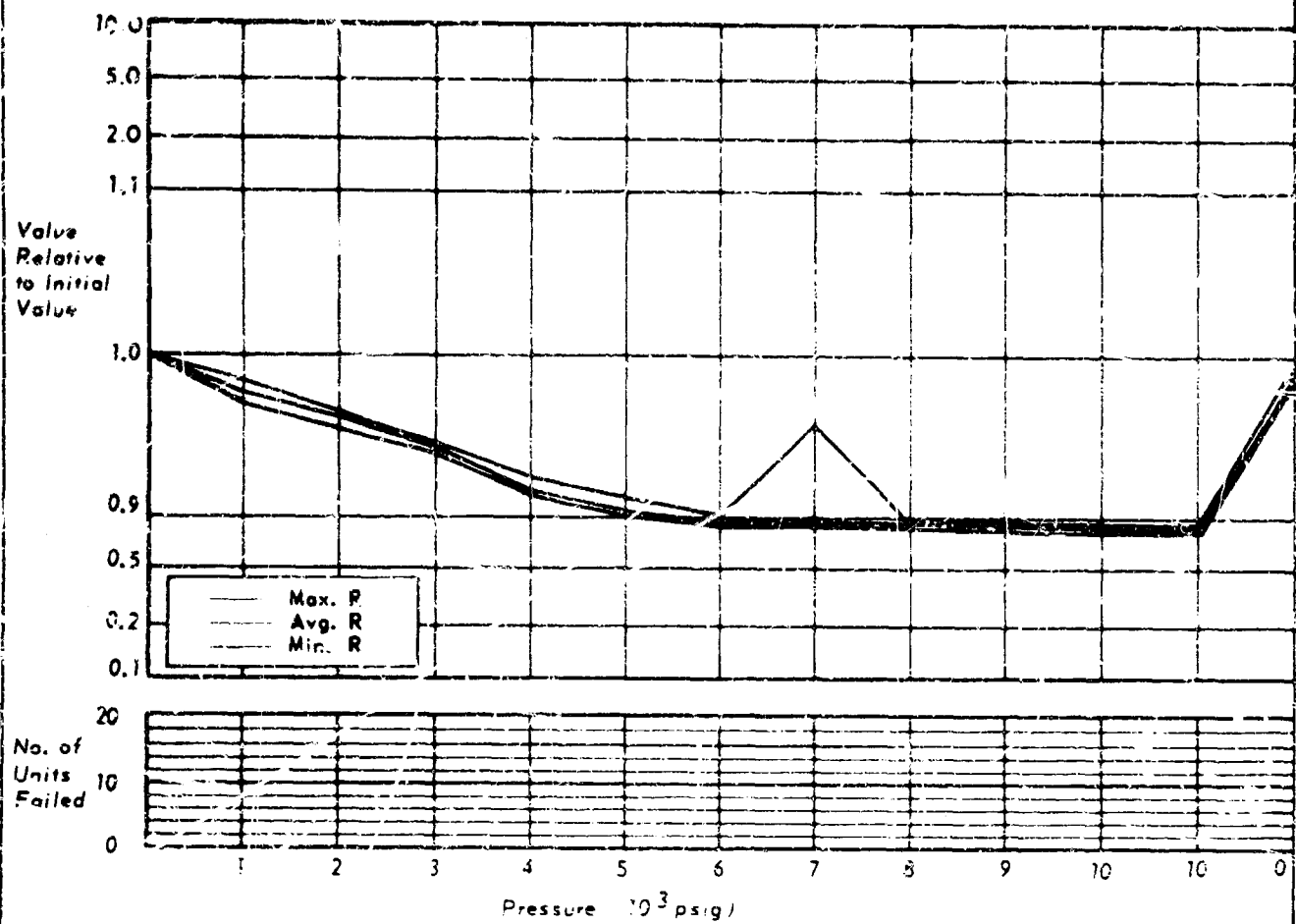
MECHANICAL: No apparent damage.

ELECTRICAL: Six components indicated a change greater than 10% with subsequent recovery to less than 10% change on return to 0 psig.

Thirteen components indicated less than 10% change.

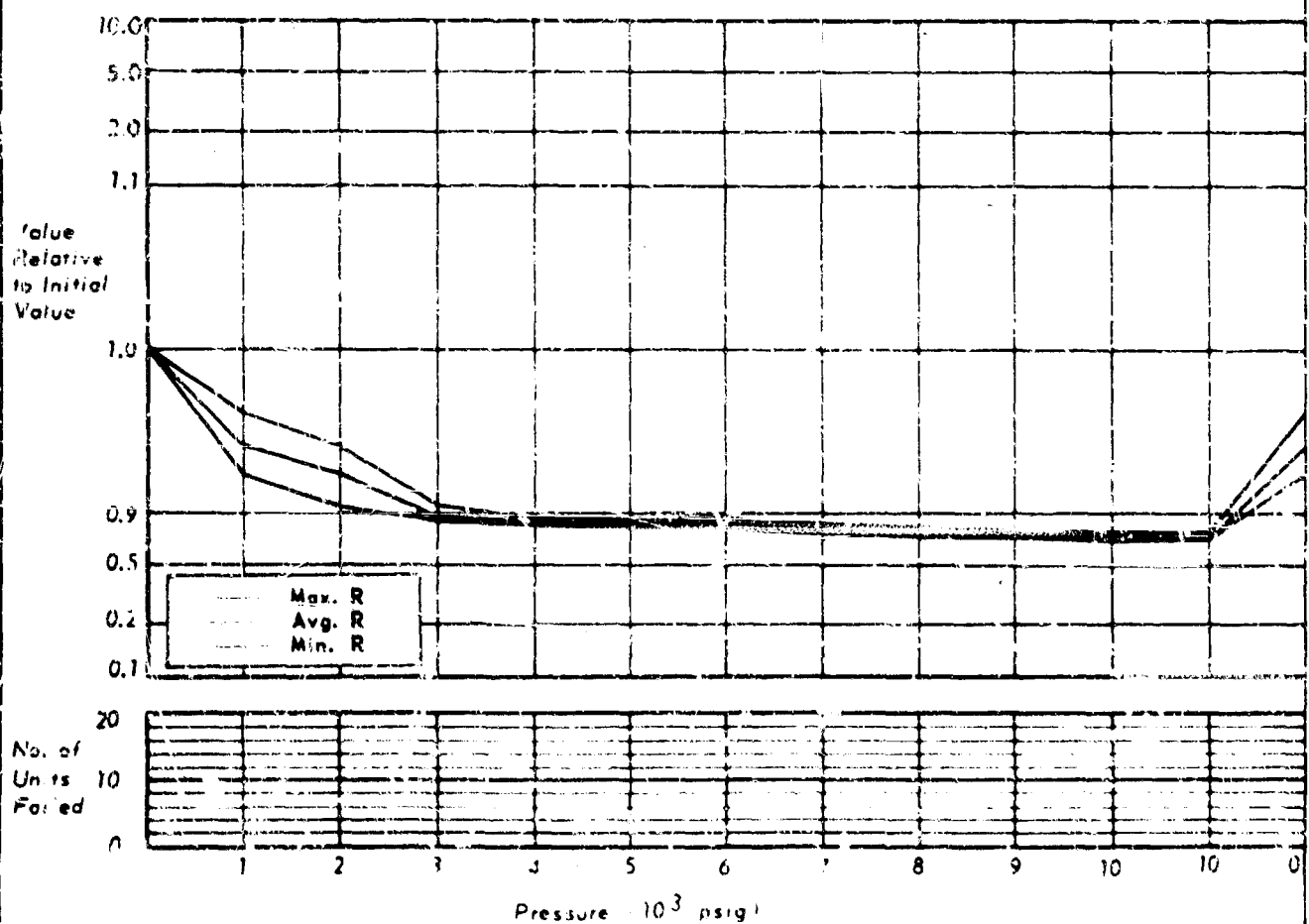
MFG.-ALLEN BRADLEY
 TYPE-RESISTOR
 DESCRIPTION-EB-1035

CHART NO. 93
 NO. OF SAMPLES TESTED-10



MFG.-ALLEN BRADLEY
 TYPE-RESISTOR
 DESCRIPTION-EB-1085

CHART NO. 94
 NO. OF SAMPLES TESTED-19



Allen-Bradley

10 K Ω $\pm$ 5%

Composition

EB 1035

70.71 V max

Tubular, axial lead

Resistor

0.5 W

0.375 x 0.14" diam.

SOAK PERIOD: 16 hours at 7,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated a change greater than 10% with subsequent recovery to less than 10% change on return to 0 psig.

Allen-Bradley

1.0 M Ω $\pm$ 5%

Composition

EB 1055

350.0 V max

Tubular, axial lead

Resistor

0.375 x 0.14" diam.

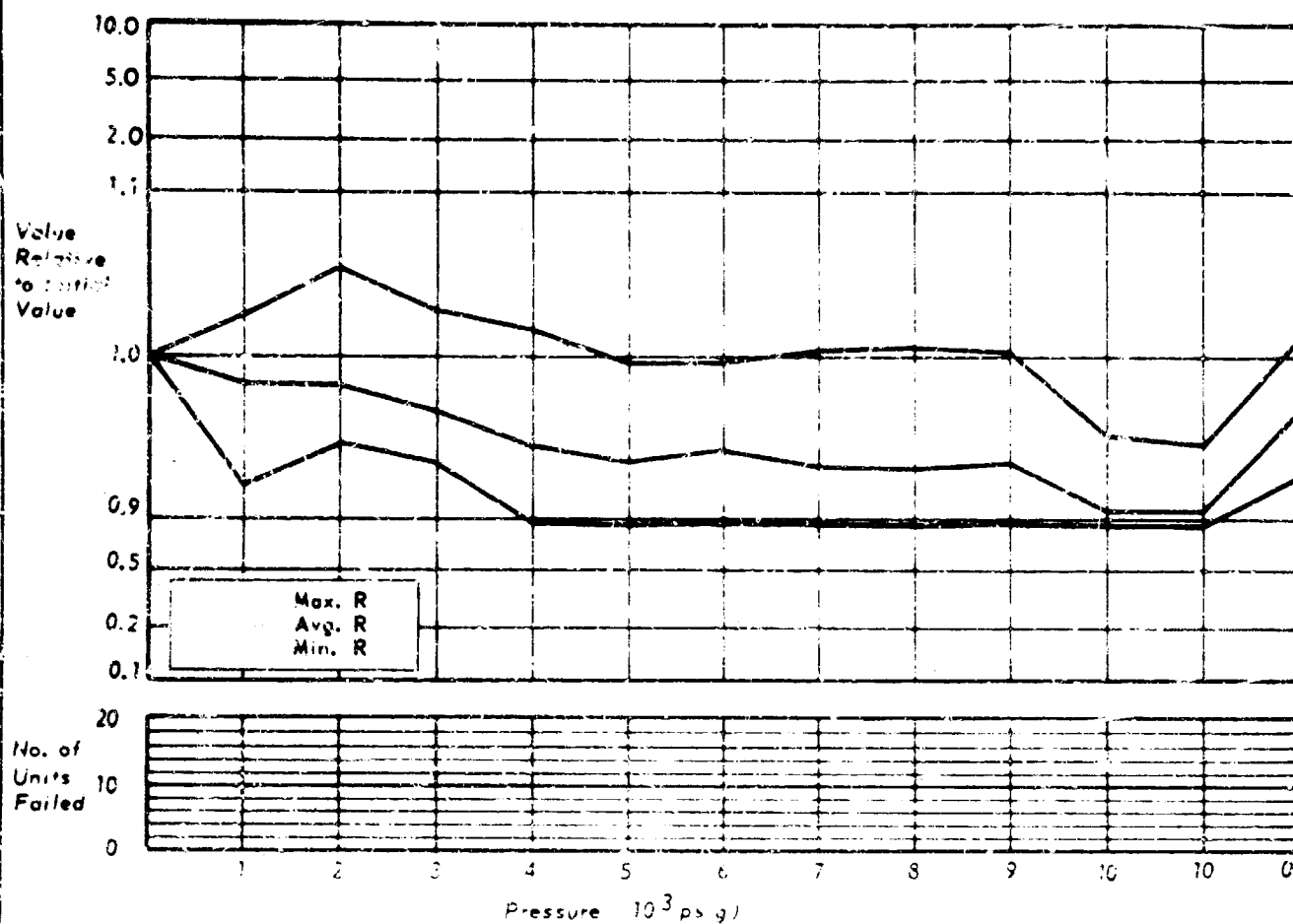
SOAK PERIOD: 15.5 hours at 10,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated a change greater than 10% with subsequent recovery to less than 10% change on return to 0 psig.

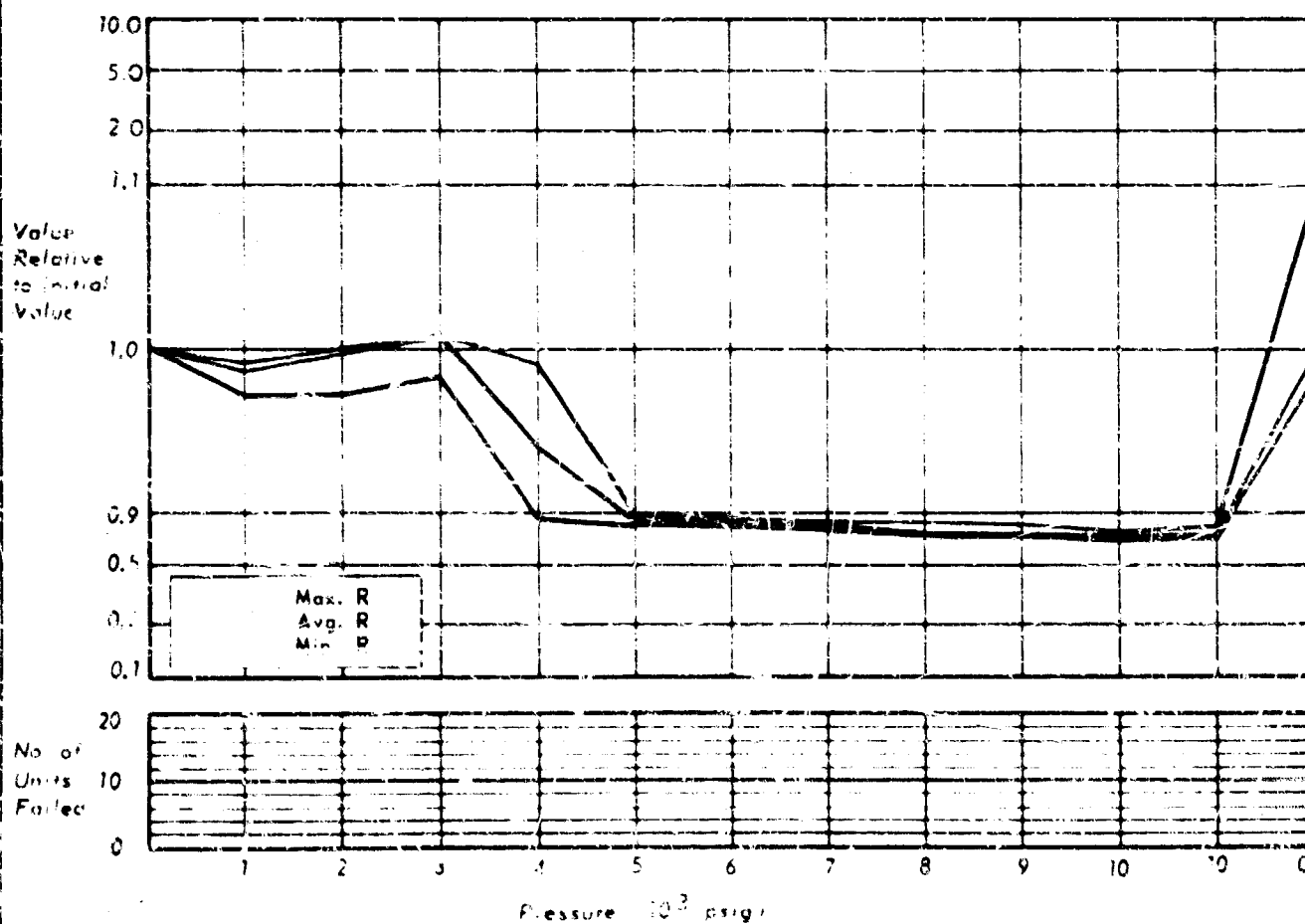
MFG.-ALLEN BRADLEY
 TYPE-RESISTOR
 DESCRIPTION-CS-1004

CHART NO. 93
 NO. OF SAMPLES TESTED-20



MFG.-ALLEN BRADLEY
 TYPE-RESISTOR
 DESCRIPTION-CS-1034

CHART NO. 95
 NO. OF SAMPLES TESTED-20



Allen-Bradley	$10\ \Omega \pm 2\%$	Composition, herm sealed
CS 1004	1.58 V max	Tubular, axial lead
Resistor	0.25 W	0.375 x 0.14" diam

SOAK PERIOD: 15 hours at 8,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: Three components indicated a change greater than 10% with subsequent recovery to less than 10% change on return to 0 psig.

Allen-Bradley	$10\ K\Omega \pm 2\%$	Composition, herm sealed
CS 1034	50.0 V max	Tubular, axial lead
Resistor	0.25 W	0.375 x 0.14" diam

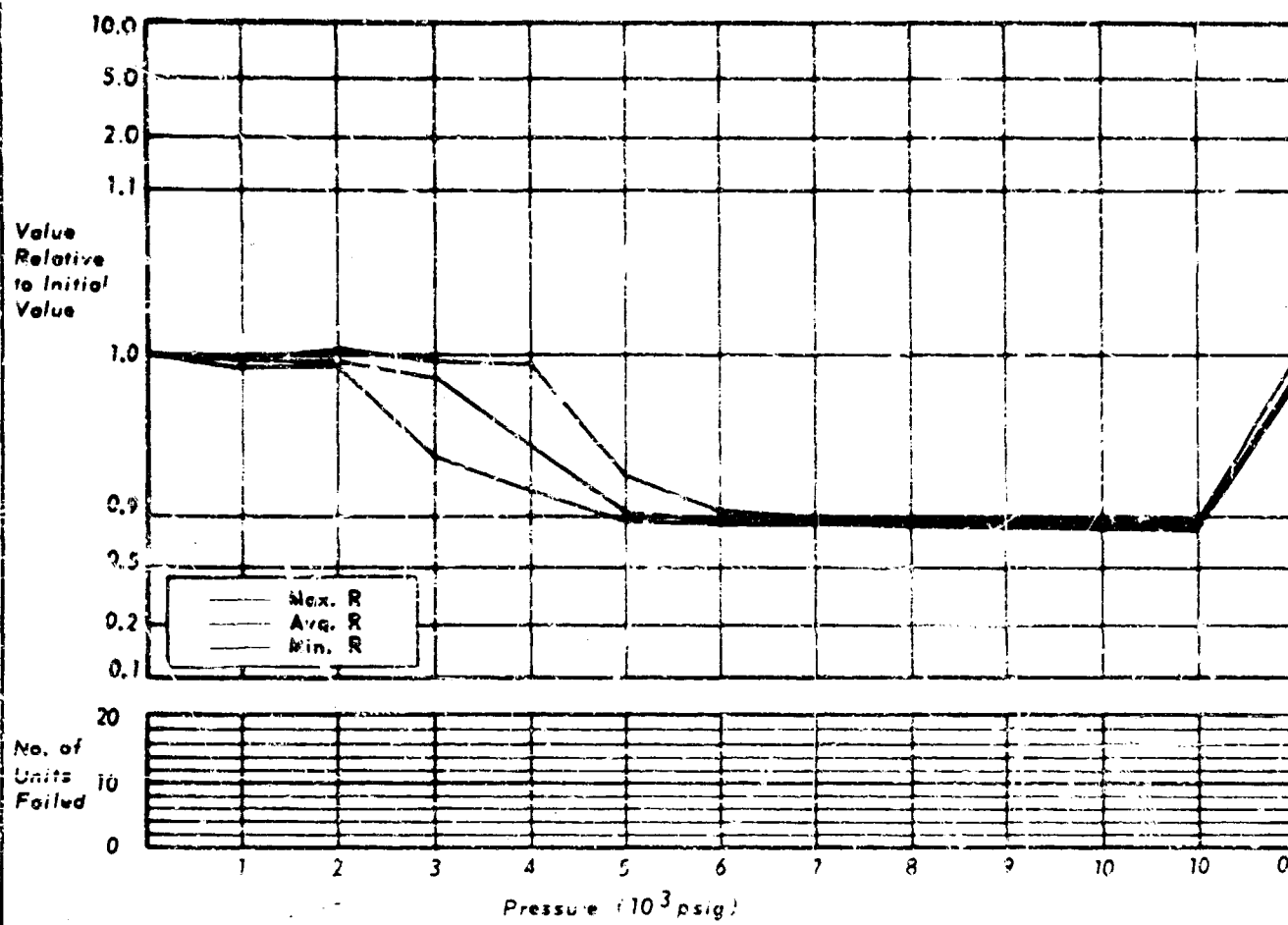
SOAK PERIOD: 16 hours at 7,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated a change greater than 10% with subsequent recovery to less than 10% change on return to 0 psig.

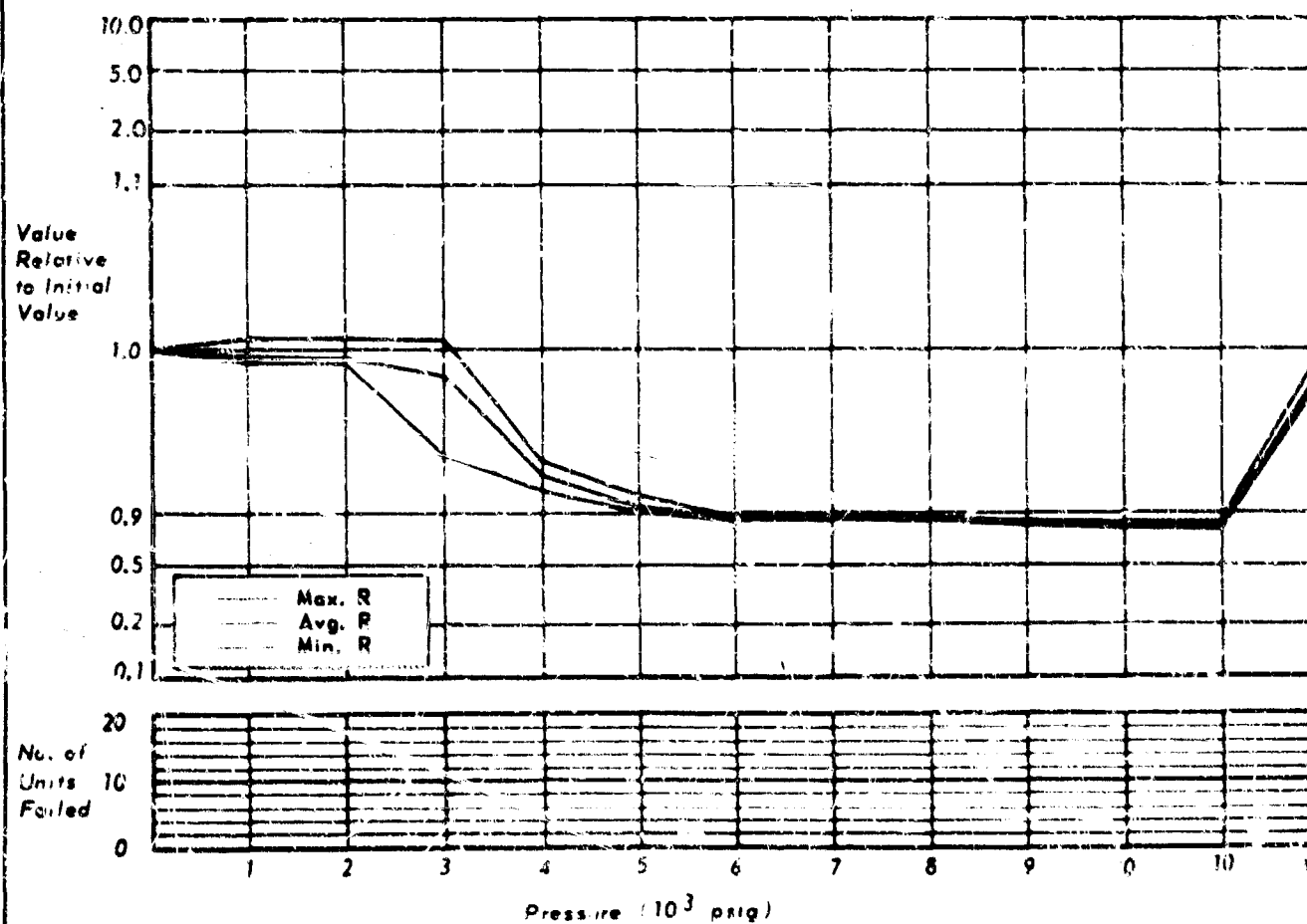
MFG.-ALLEN BRADLEY
TYPE-RESISTOR
DESCRIPTION-ED-1004

CHART NO. 97
NO. OF SAMPLES TESTED-20



MFG.-ALLEN BRADLEY
TYPE-RESISTOR
DESCRIPTION-ED-1004

CHART NO. 98
NO. OF SAMPLES TESTED-19



Aller-Bradley

1.0 M Ω $\pm$ 2%

Composition, herm sealed

CS 1034

250.0 V max

Tubular, axial lead

Resistor

0.375 x 0.14" diam.

SOAK PERIOD: 16 hours at 7,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated a change greater than 10% with subsequent recovery to less than 10% change on return to 0 psig.

Aller-Bradley

10 Ω $\pm$ 2%

Composition, herm sealed

CS 1004

2.23 V max

Tubular, axial lead

Resistor

0.5 W

0.56 x 0.255" diam.

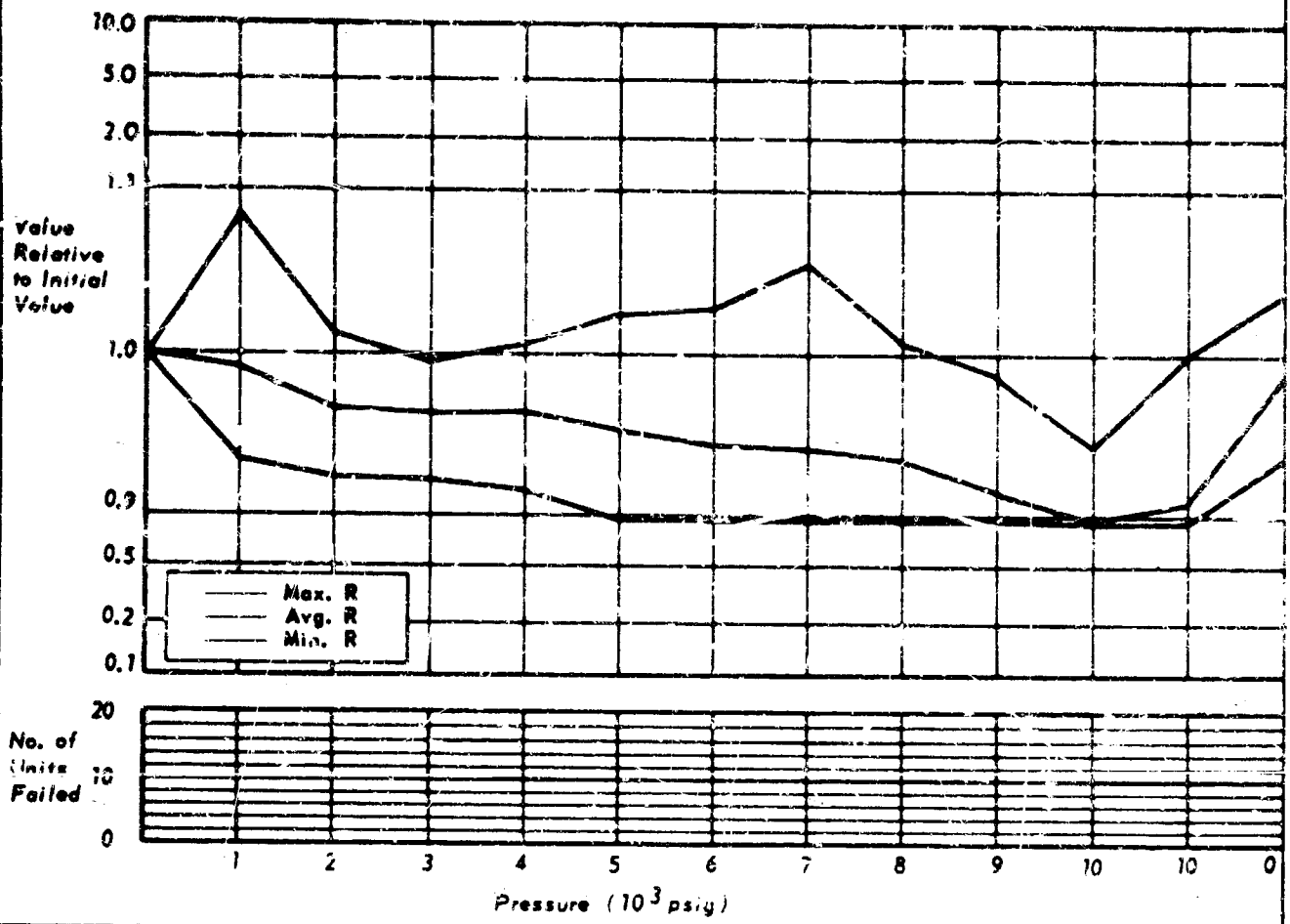
SOAK PERIOD: 16 hours at 8,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated a change greater than 10% with subsequent recovery to less than 10% change on return to 0 psig.

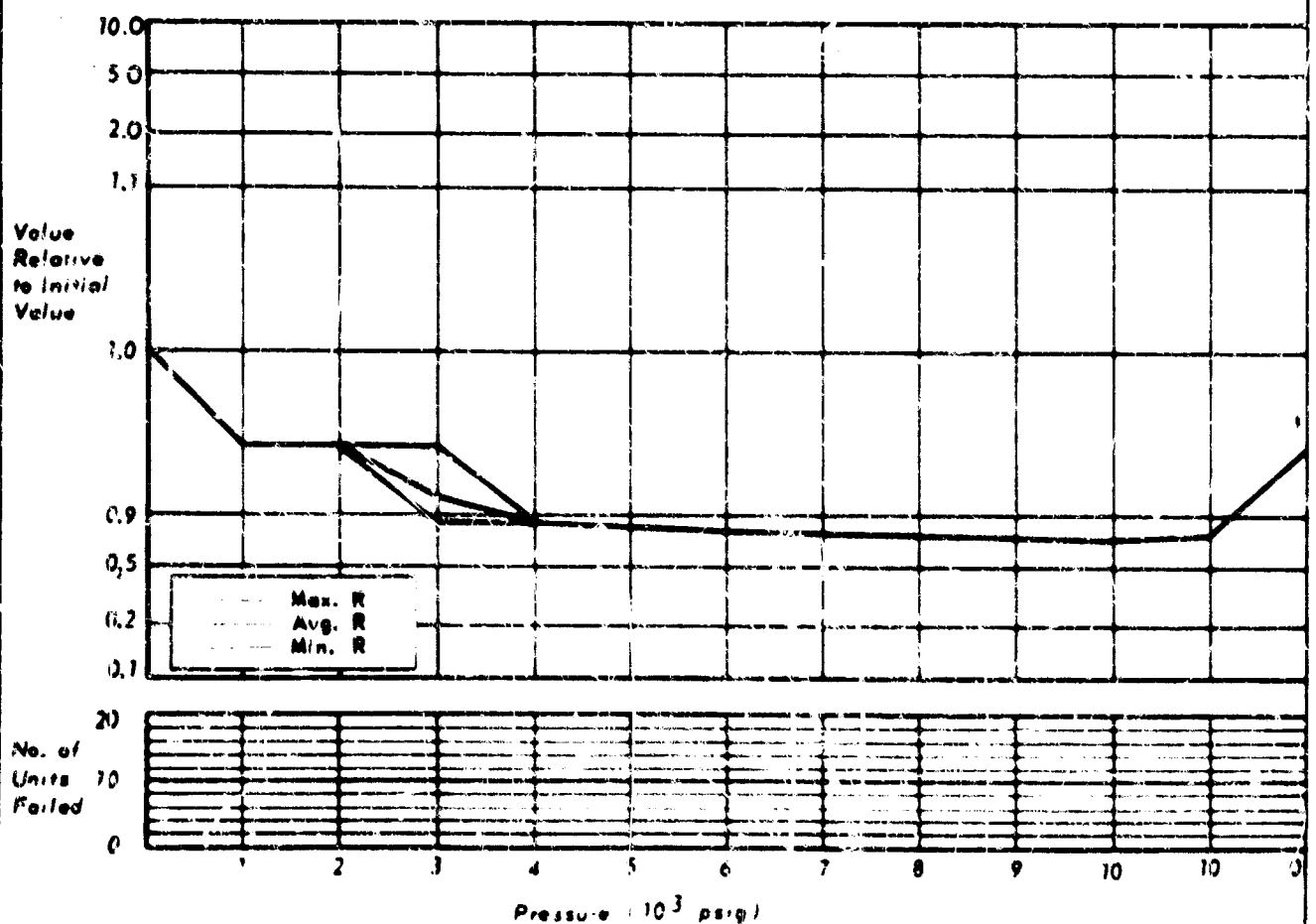
MFG.-ALLEN BRADLEY
 TYPE-RESISTOR
 DESCRIPTION-E8-1084

CHART NO. 99
 NO. OF SAMPLES TESTED-20



MFG.-ALLEN BRADLEY
 TYPE-RESISTOR
 DESCRIPTION-E8-1084

CHART NO. 100
 NO. OF SAMPLES TESTED-20



Allen-Bradley	10 K Ω $\pm$ 2%	Composition, herm sealed
ES 1034	70.71 V max	Tubular, axial lead
Resistor	0.5 W	0.56 x 0.225" diam.

SOAK PERIOD: 16 hours at 8,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated a change greater than 10% with subsequent recovery to less than 10% change on return to 0 psig.

Allen-Bradley	1.0 M $\pm$ 2%	Composition, herm sealed
ES 1054	350.0 V max	Tubular, axial lead
Resistor		0.56 x 0.225" diam.

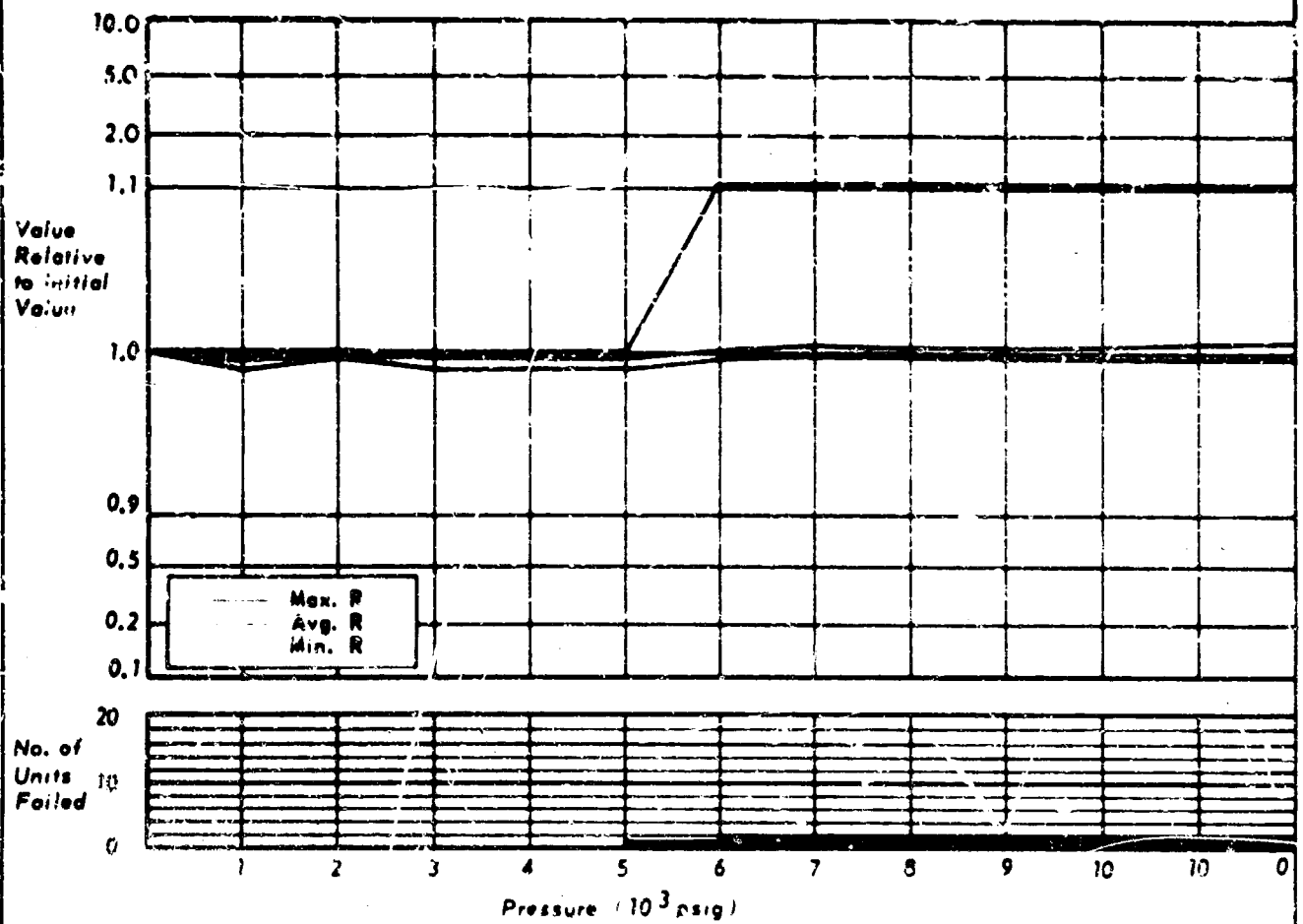
SOAK PERIOD: 16 hours at 8,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated a change greater than 10% with subsequent recovery to less than 10% change on return to 0 psig.

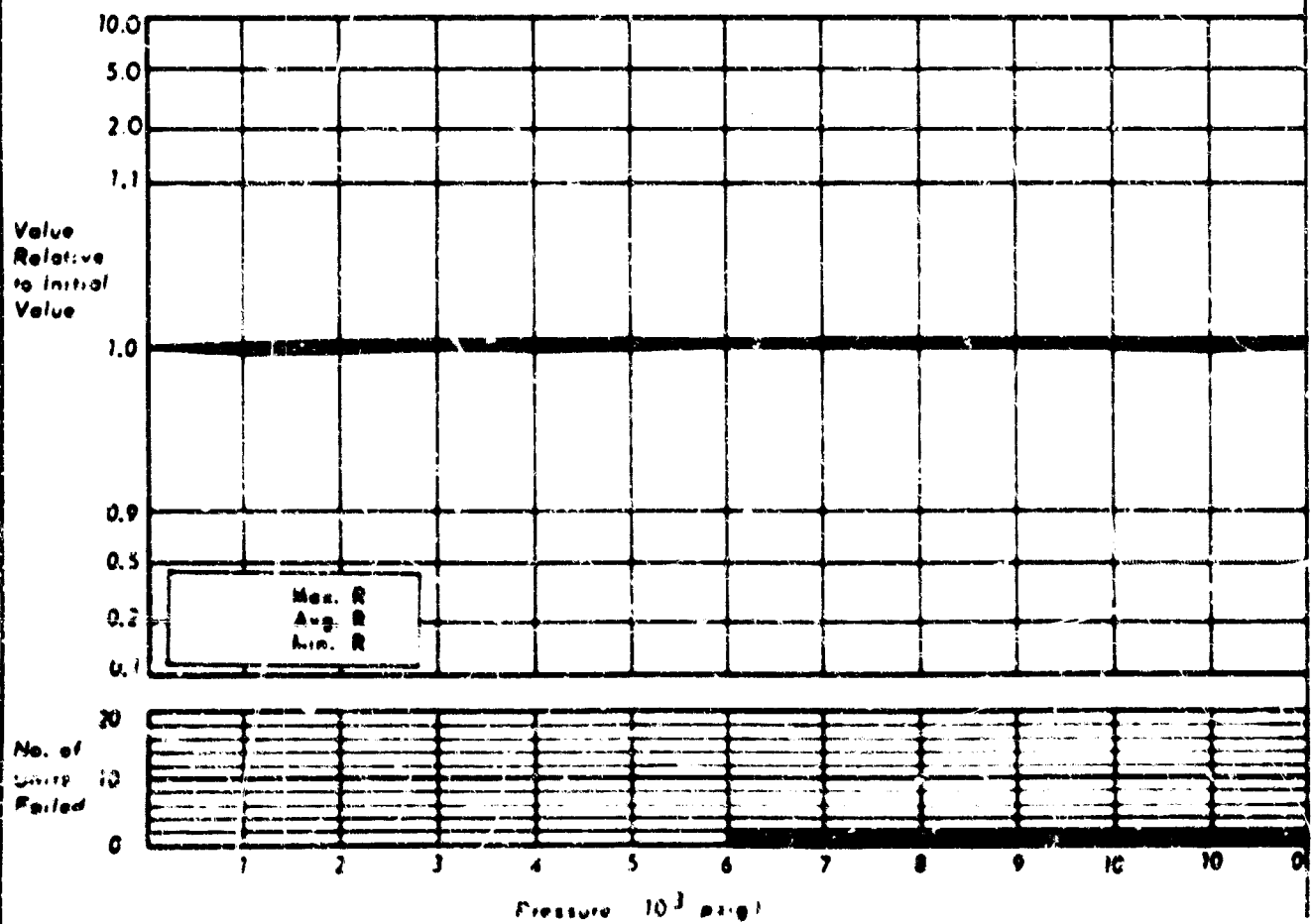
MFG. - ALLEN BRADLEY
 TYPE - RESISTOR
 DESCRIPTION - CA410000FY

CHART NO. 101
 NO. OF SAMPLES TESTED - 20



MFG. - ALLEN BRADLEY
 TYPE - RESISTOR
 DESCRIPTION - CA400000FY

CHART NO. 102
 NO. OF SAMPLES TESTED - 20



Allen-Bradley
CAH 10300 FY
Resistor

1 K Ω $\pm$ 1%
15.81 V max
0.25 W

Metal film, herm sealed
Tubular, axial lead
0.56 x 0.225" diam.

SOAK PERIOD: None

MECHANICAL: No apparent damage.

ELECTRICAL: Eighteen components indicated less than 10% change.

FAILURES: Two components indicated a permanent change greater than 50% at the pressures shown on the failure graph on opposite page.

Allen-Bradley
CAH 98002 FY
Resistor

988 K Ω $\pm$ 1%
300.0 V max
1 W

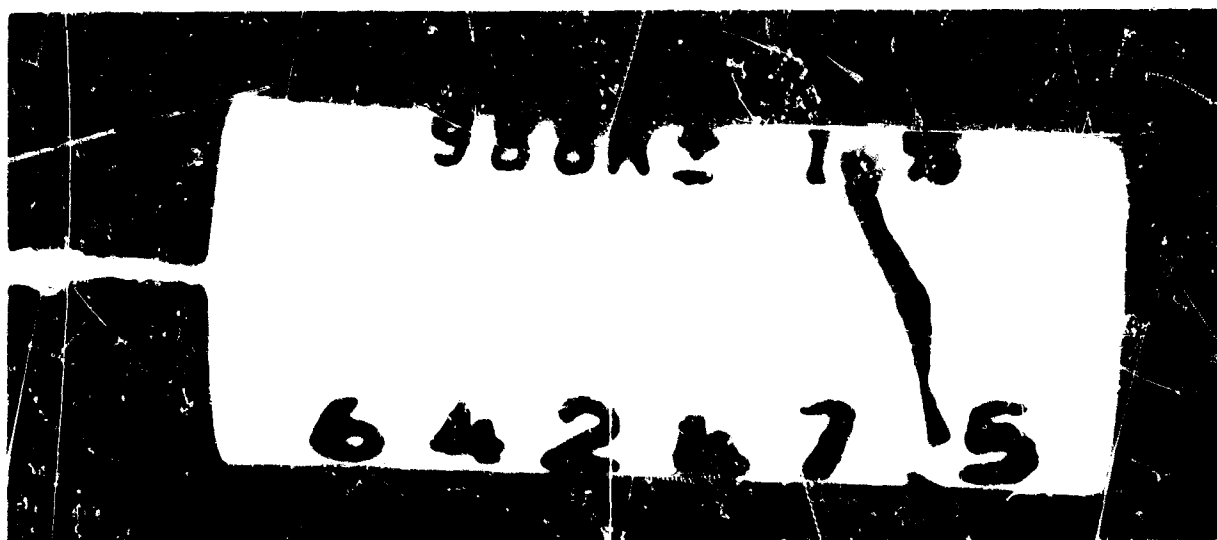
Metal film, herm sealed
Tubular, axial lead
0.56 x 0.225" diam

SOAK PERIOD: None

MECHANICAL: Visual inspection after completion of test showed a crack in the ceramic case of one component. This component functioned normally throughout the test.

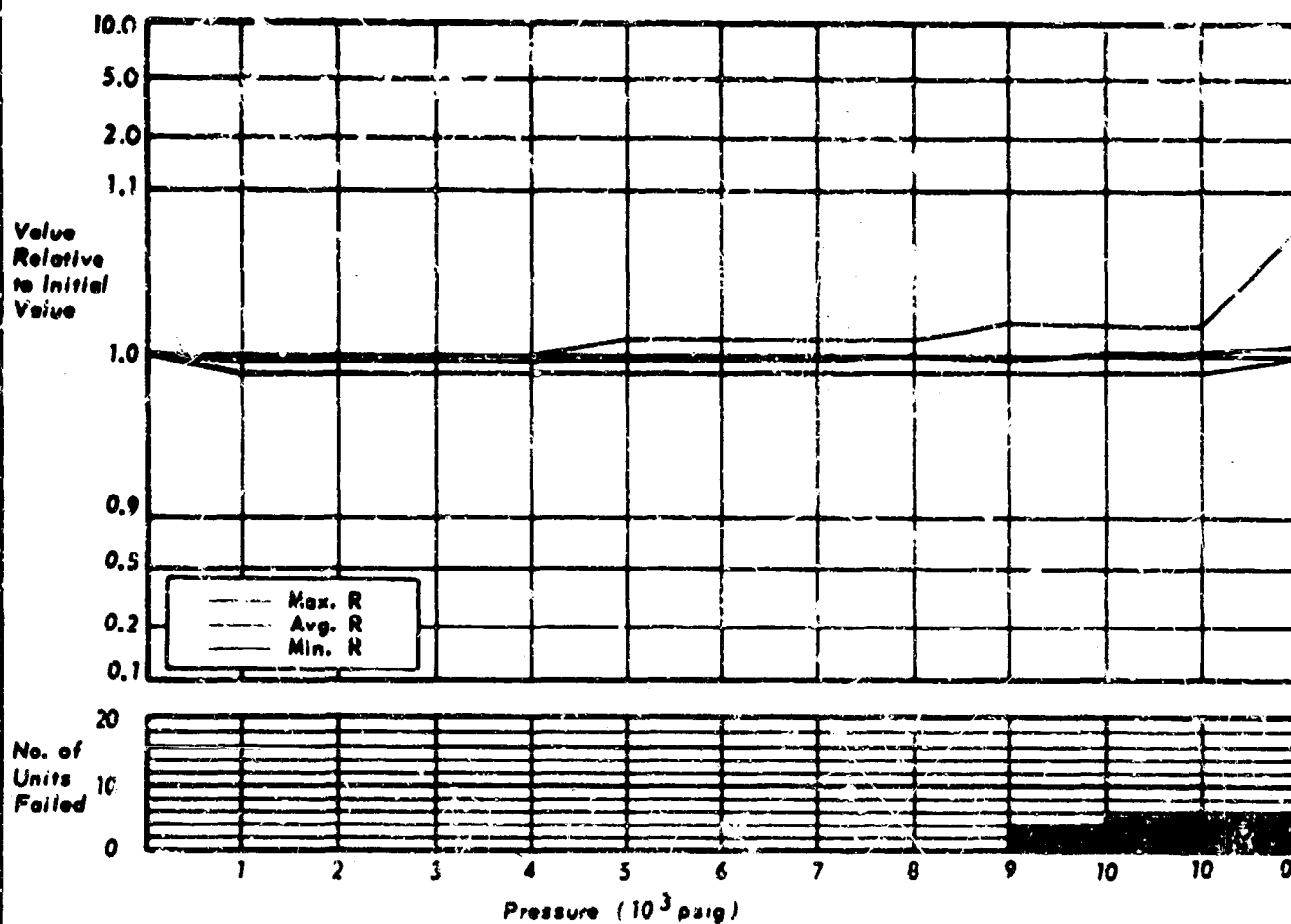
ELECTRICAL: Eighteen components indicated less than 10% change.

FAILURES: Two components indicated a permanent change greater than 50% at the pressures shown on the failure graph on opposite page.



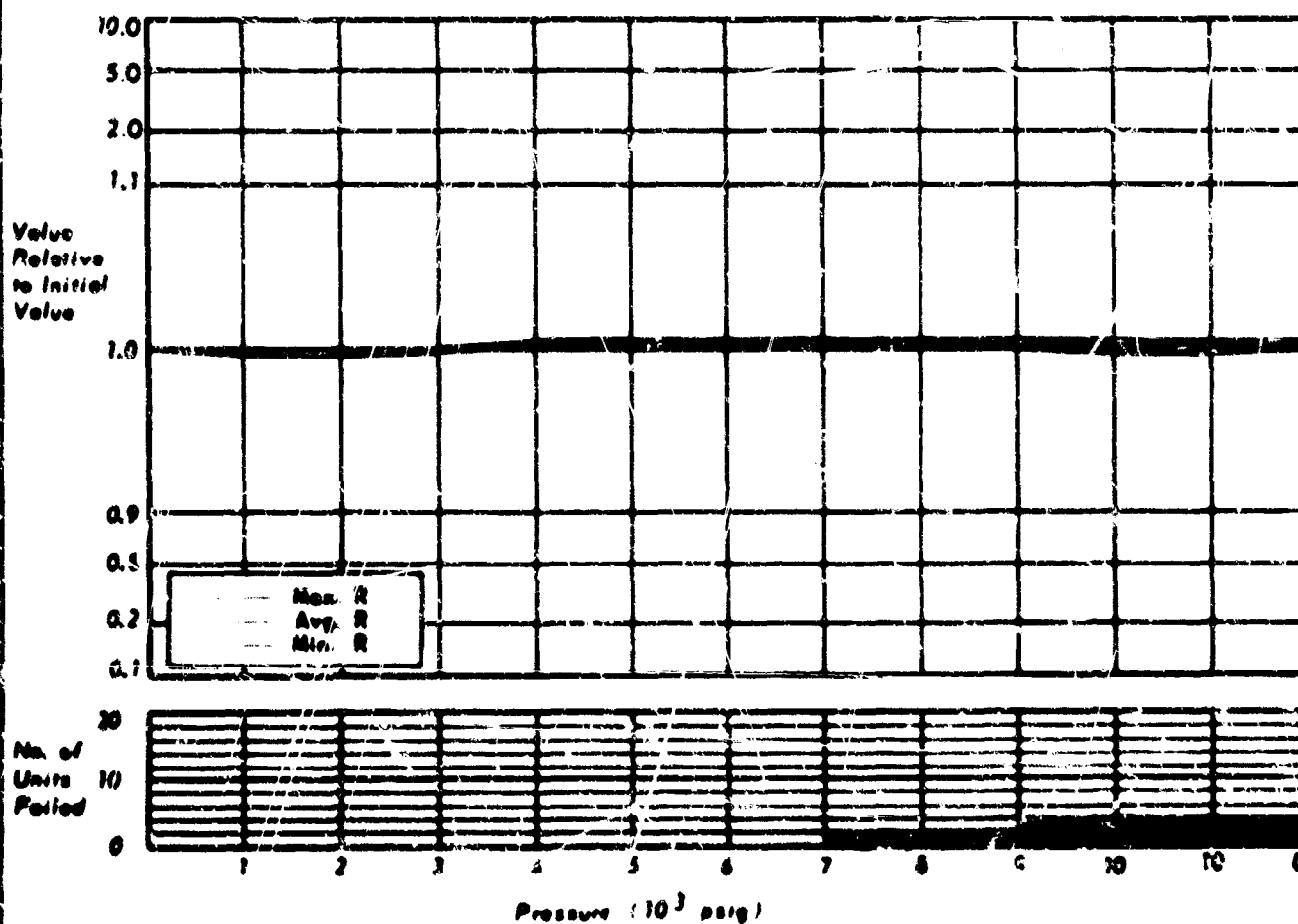
MFG. - ALLEN BRADLEY
 TYPE - RESISTOR
 DESCRIPTION - EAM 1250R P7

CHART NO. 103
 NO. OF SAMPLES TESTED - 19



MFG. - ALLEN BRADLEY
 TYPE - RESISTOR
 DESCRIPTION - EAM 1000R P7

CHART NO. 104
 NO. OF SAMPLES TESTED - 20



Allen-Bradley
EAM 10000 FY
Resistor

1 K Ω $\pm$ 1%
22.36 V max
0.5 W

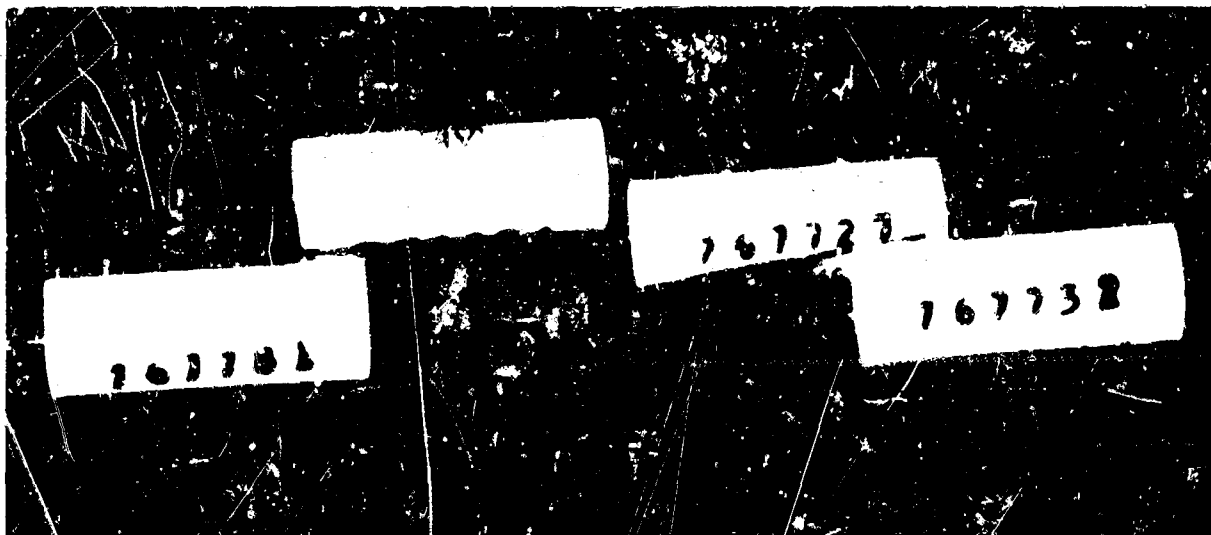
Metal film, herm sealed
Tubular, axial lead
0.83 x 0.312" diam.

SOAK PERIOD: None

MECHANICAL: Visual inspection following completion of tests showed cracked ceramic cases of ten components. Five of the damaged components remained functional throughout the entire test.

ELECTRICAL: Fourteen components indicated less than 10% change.

FAILURES: Five components indicated a permanent change greater than 50% at the pressures shown on the failure graph on opposite page.



Allen-Bradley
EAM 100001 FY

10 K Ω $\pm$ 1%
78.71 V max
0.5 W

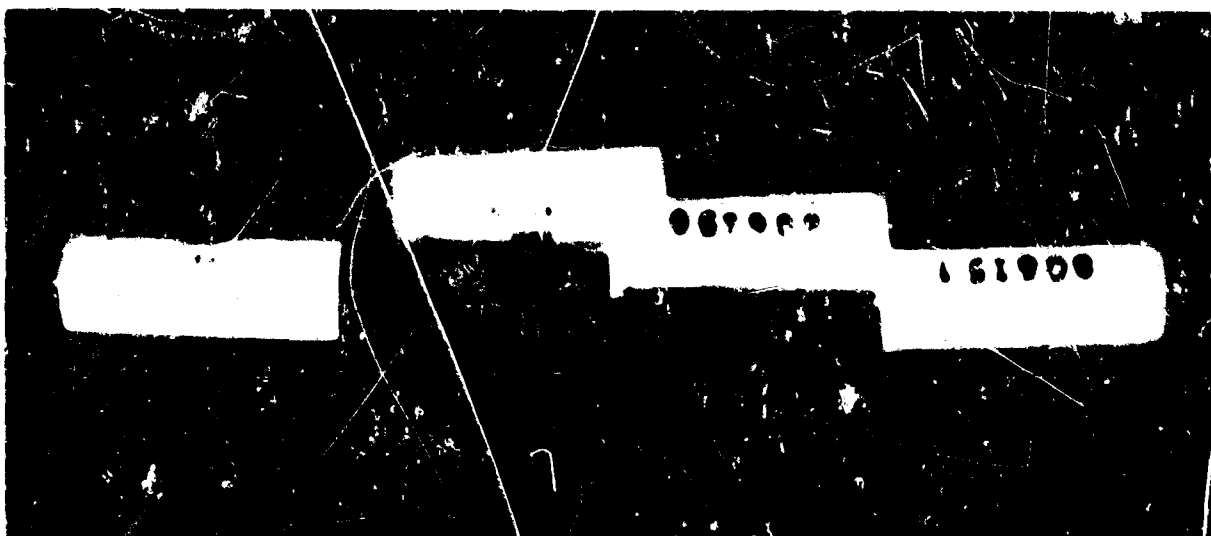
Metal film, herm sealed
Tubular, axial lead
0.83 x 0.312" diam.

SOAK PERIOD: None

MECHANICAL: Visual inspection following completion of tests showed cracked ceramic cases of ten components. Three of the damaged components remained functional throughout the entire test.

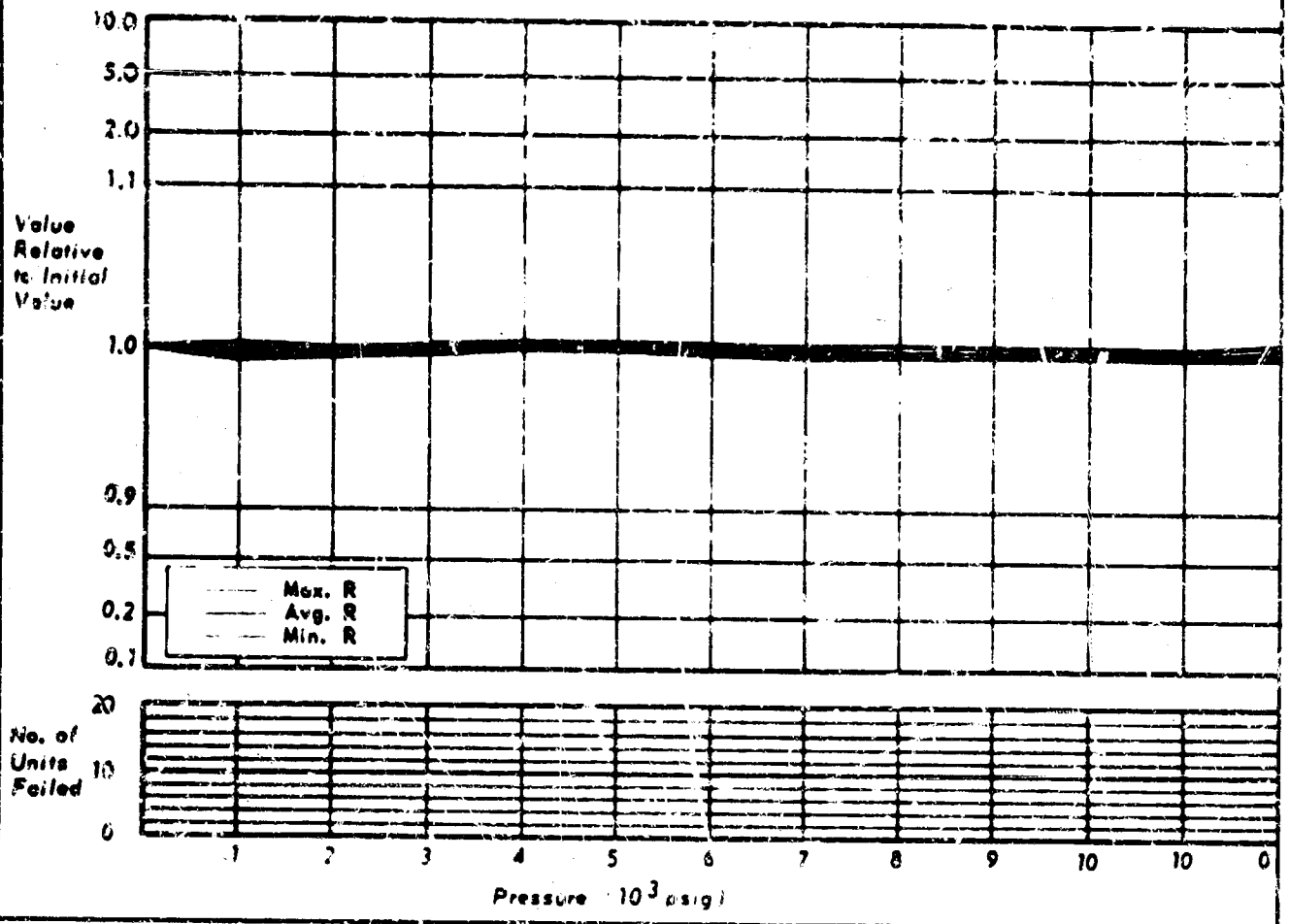
ELECTRICAL: Seventeen components indicated less than 10% change.

FAILURES: Three components indicated a permanent change greater than 50% at the pressures shown on the failure graph on opposite page.



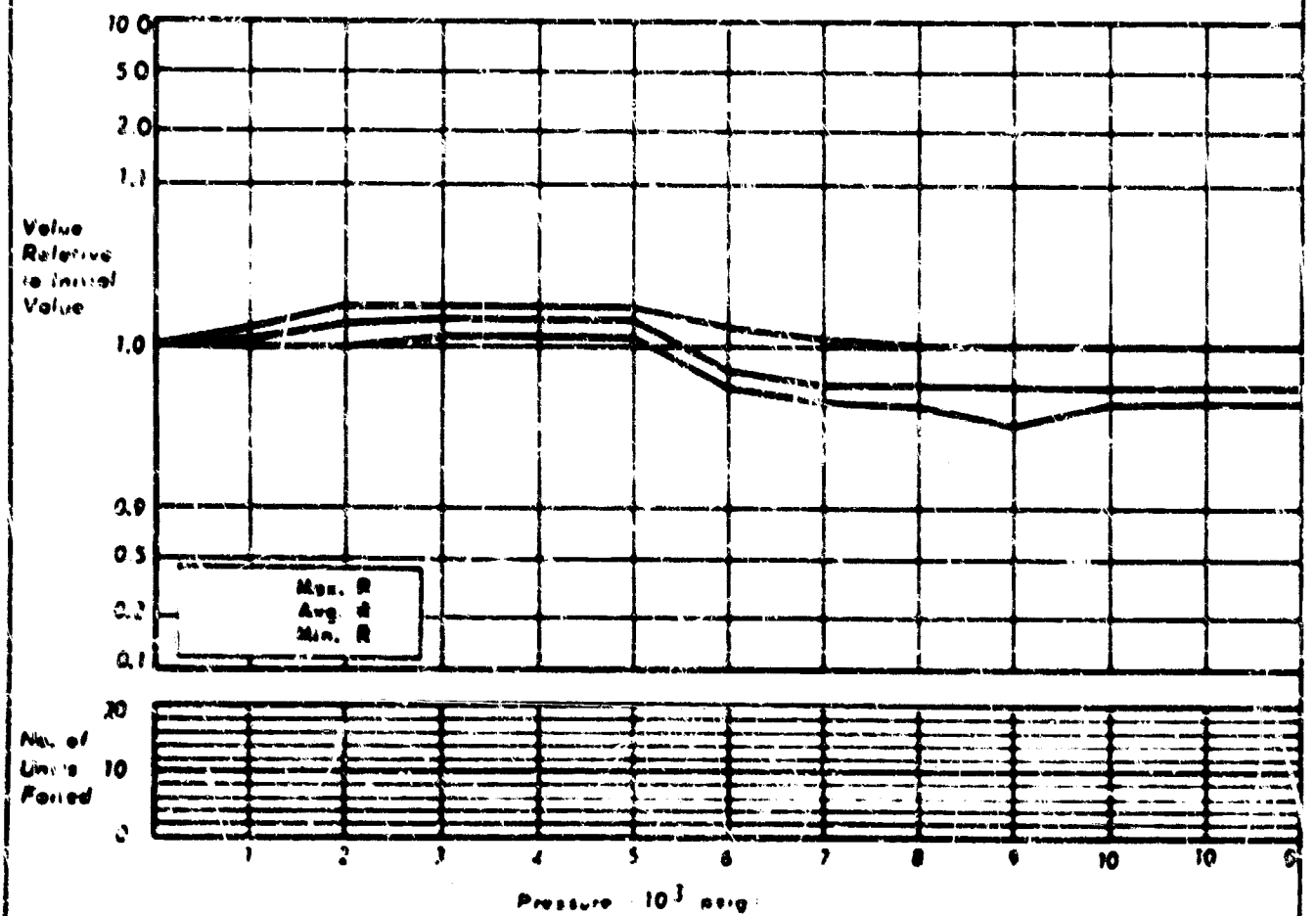
MFG. - ALLEN SWADLEY
 TYPE - RESISTOR
 DESCRIPTION - C&N 1000017

CHART NO. 105
 NO. OF SAMPLES TESTED - 20



MFG. - CORNING
 TYPE - RESISTOR
 DESCRIPTION - C-20

CHART NO. 106
 NO. OF SAMPLES TESTED - 20



Allan-Bradley

CAH100001FY

Resistor

10 K Ω $\pm$ 1%

300 V max

1W

Astal film, hermetically sealed

Tubular, axial lead

0.33 x 0.312" diam.

SOAK PERIOD: None

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

Corning

CT-20

Resistor

209 Ω & 470 K Ω

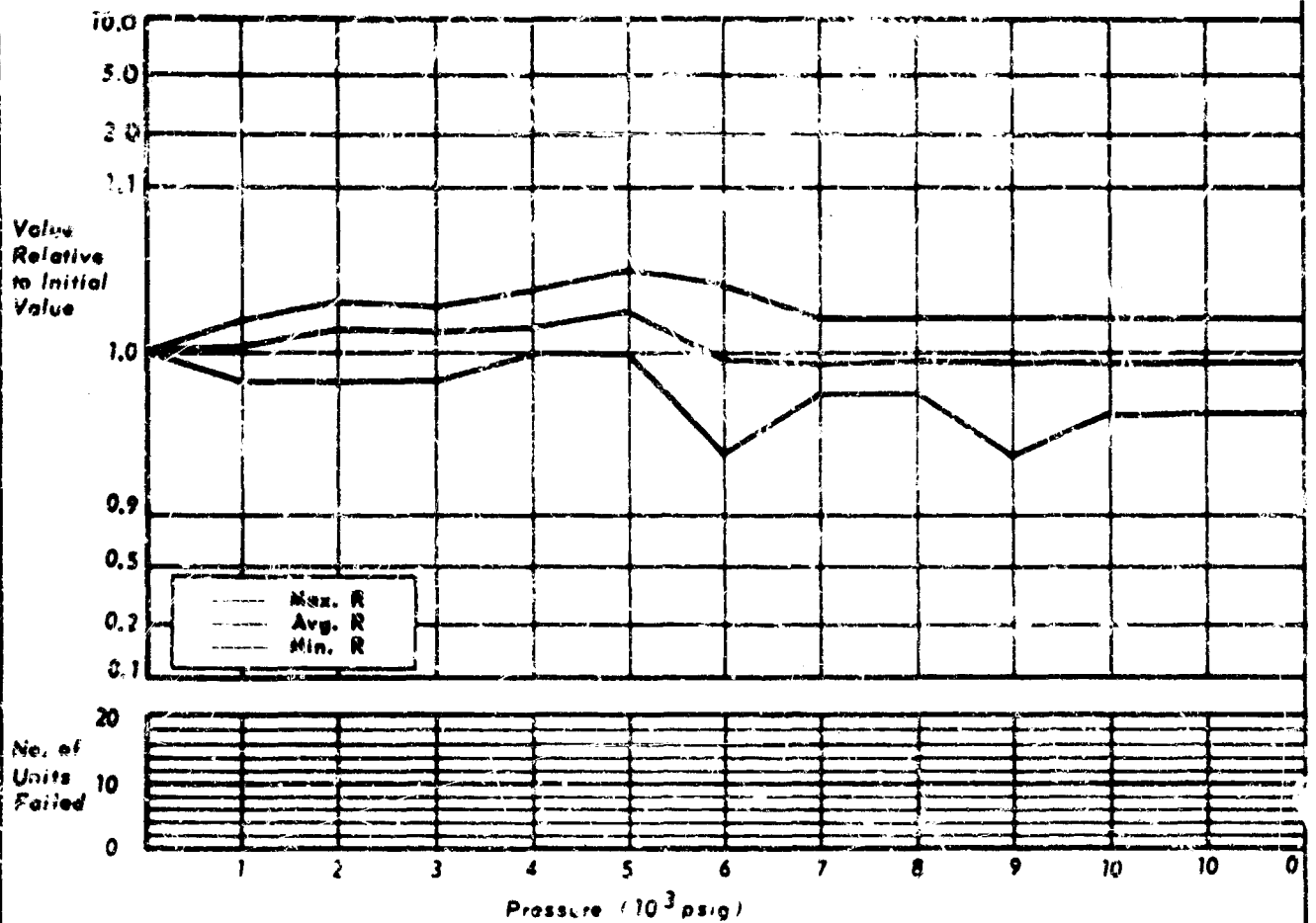
Experimental

SOAK PERIOD: None

MECHANICAL: All components indicated less than 10% change.

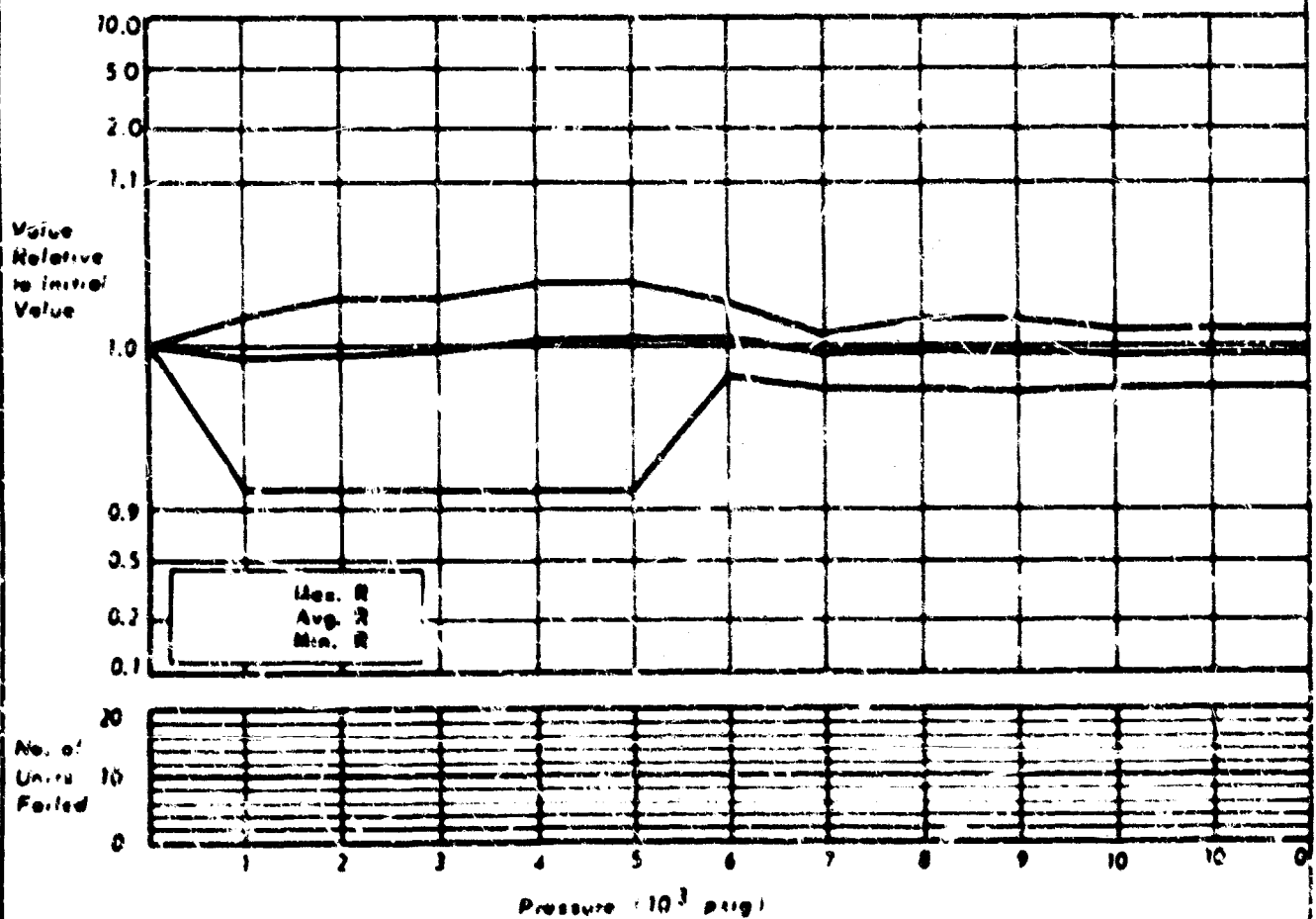
MFG. - CORNING
TYPE - RESISTOR
DESCRIPTION - NA-68

CHART NO. 107
NO. OF SAMPLES TESTED - 20



MFG. - CORNING
TYPE - RESISTOR
DESCRIPTION - NA-60

CHART NO. 108
NO. OF SAMPLES TESTED - 20



Corning
NA-65
Resistor

See Note

Silicon-epoxy coat
Tubular, axial lead

NOTE: Nine different values of the NA-65 type resistor were submitted for test. Since all components were of the same type the twenty components were tested as a set. The values and numbers submitted are listed below.

Value	Quantity	Value	Quantity
10.0 Ω	2	255 K Ω	2
14.7 Ω	2	499 K Ω	2
10.6 Ω	2	51.1 Ω	3
100.0 Ω	2	100.0 K Ω	3
10 K Ω	2		

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

Corning
NA-60
Resistor

See Note

Silicon-epoxy coat
Tubular, axial lead

NOTE: Nine different values of the NA-65 type resistor were submitted for test. Since all components were of the same type the twenty components were tested as a set. The values and numbers submitted are listed below.

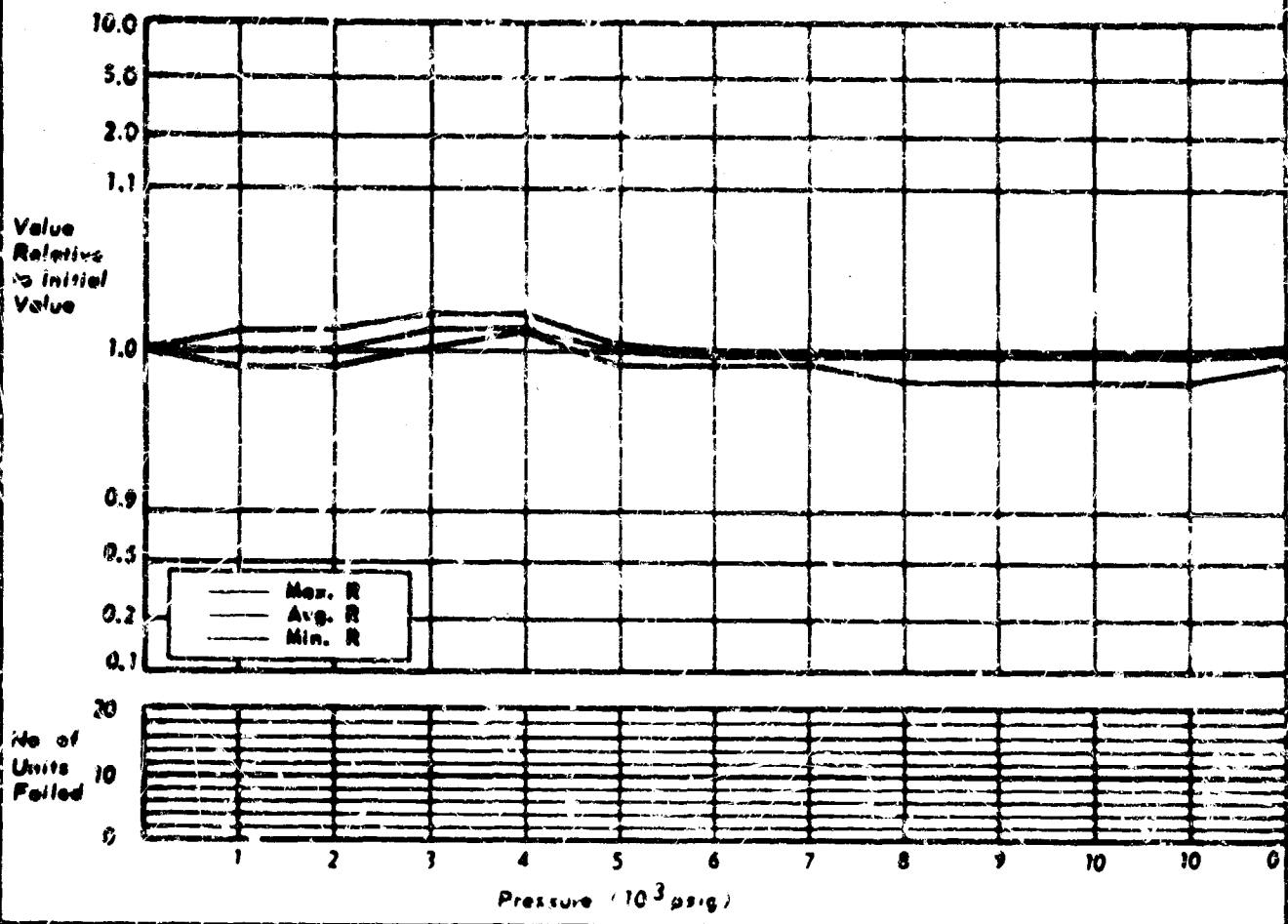
Value	Quantity	Value	Quantity
10.0 Ω	3	100 K Ω	3
23.7 Ω	3	150 K Ω	3
51.1 Ω	3	82.5 Ω	2
100.0 Ω	3		

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

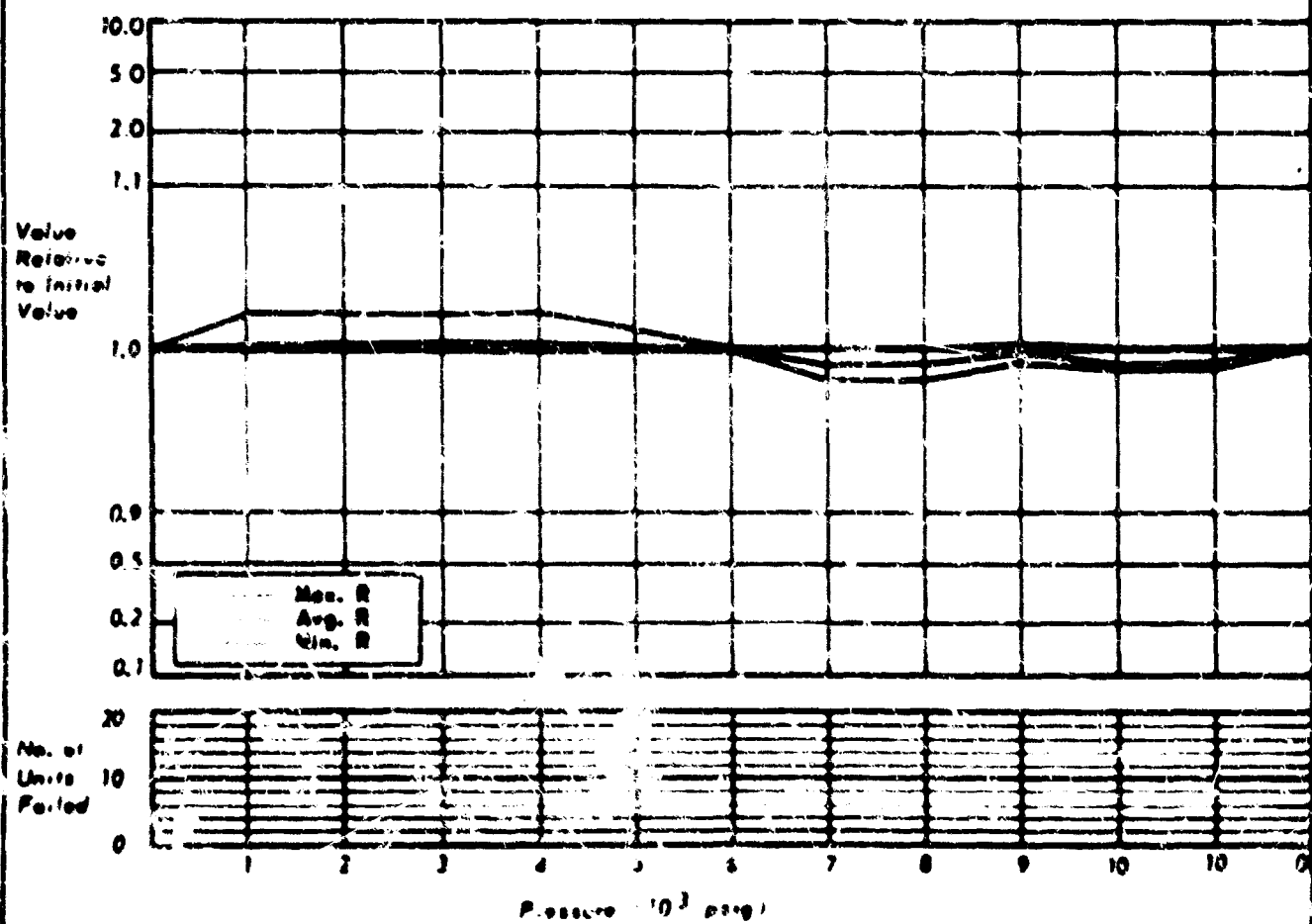
MFC-CORNING
TYPE-RESISTOR
DESCRIPTION-BA 10

CHART NO. 109
NO. OF SAMPLES TESTED-21



MFC-CORNING
TYPE-RESISTOR
DESCRIPTION-BYX-8

CHART NO. 110
NO. OF SAMPLES TESTED-20



Corning

See Note

Metal film, epoxy coat

MA-70

0.5 W

Tubular, axial lead

Resistor

3.70 x 0.20" diam

NOTE: Three components of each of the seven values listed below were submitted. All components were of the same type and were therefore tested as a set of twenty one.

84.5 Ω 1 K Ω 100 K Ω 1 M Ω
100.0 Ω 10 K Ω 499 K Ω

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

Corning

See Note

Tin oxide film, glass coat

GTX-5

0.25 W

Tubular, axial lead

Resistor

0.34 x 0.15" diam.

NOTE: Ten components of each of the two values listed below were submitted for test. All components were of the same type and were therefore tested as a set of twenty.

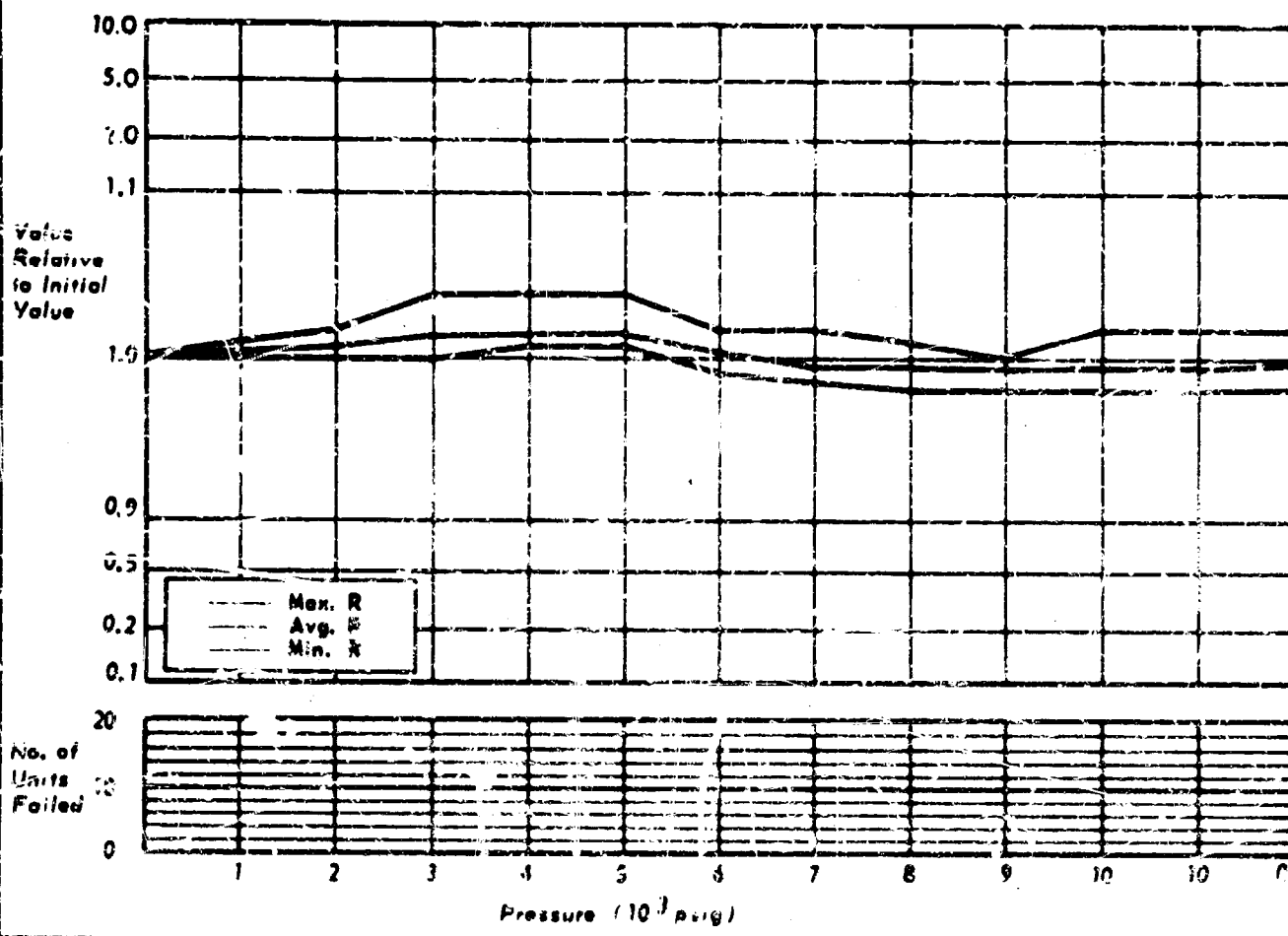
49.9 Ω
50 K Ω

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

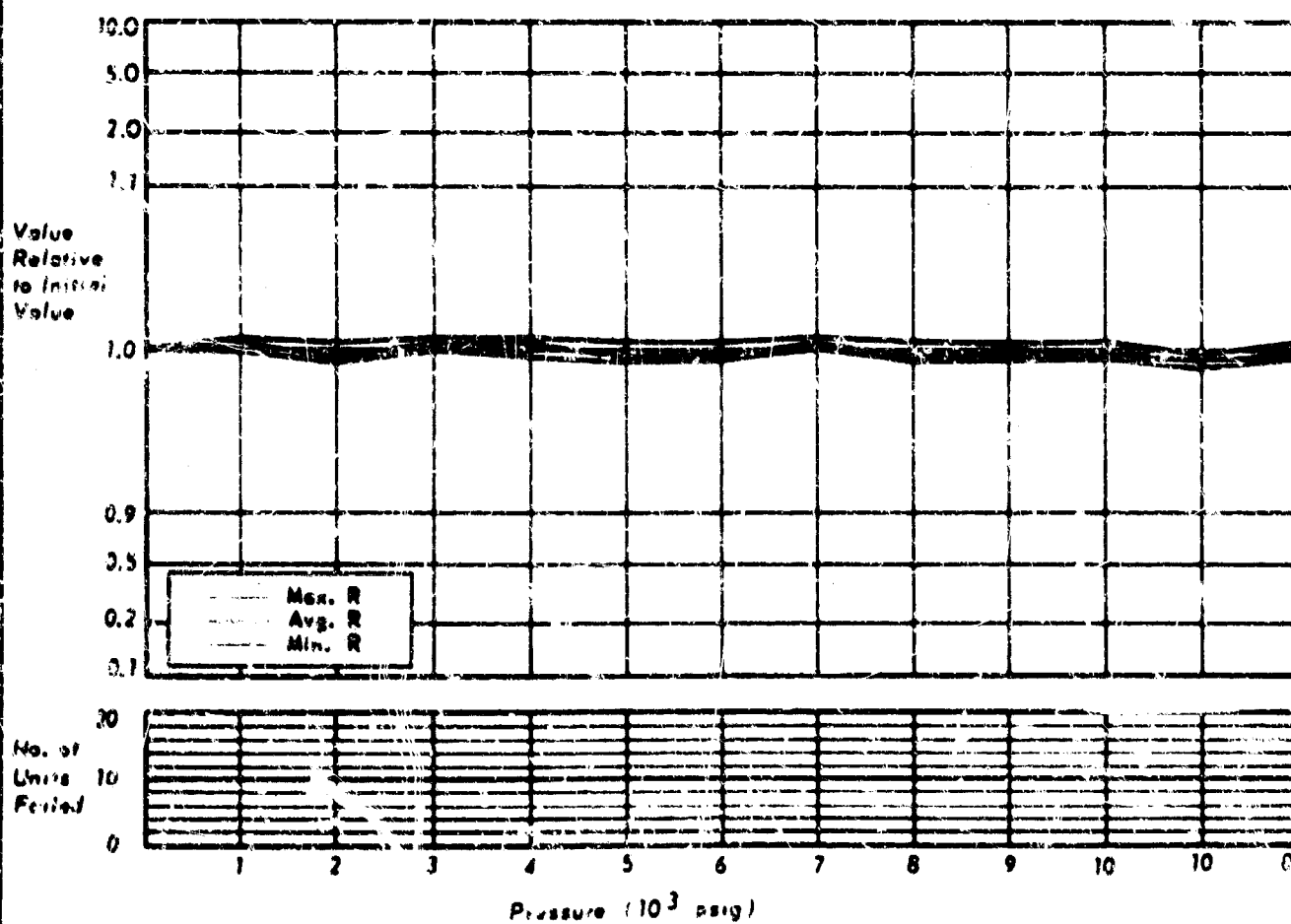
MFG. - CORNIC
 TYPE - RESISTOR
 DESCRIPTION - RA-88

CHART NO. 111
 NO. OF SAMPLES TESTED - 21



MFG. - DALE ELECTRONICS
 TYPE - RESISTOR
 DESCRIPTION - T-2MFC

CHART NO. 112
 NO. OF SAMPLES TESTED - 20



Corning

NA-55

Resistor

See Note

0.125 W

Metal film, epoxy coat

Tubular, axial lead

0.62 x 0.187" diam.

NOTE: Three components of each the seven resistance values listed below were submitted. All were NA-55 type and were therefore tested as a set of twenty one.

51 Ω 100 Ω 10 K Ω 150 K Ω

75 Ω 150 Ω 100 K Ω

MECHANICAL: No apparent damage

ELECTRICAL: All components indicated less than 10% change.

Dale

T-2 MPS- $\frac{1}{2}$

Resistor

See Note

0.5 W

Metal film, epoxy coat

Tubular, axial lead

0.70 x 0.25" diam

NOTE: Twenty components of three different resistance values were submitted. All were T-2 MPS- $\frac{1}{2}$ type and were therefore tested as a set. The values and quantity of each value are listed below.

Value	Quantity
-------	----------

100 Ω	5
--------------	---

250 K Ω	10
----------------	----

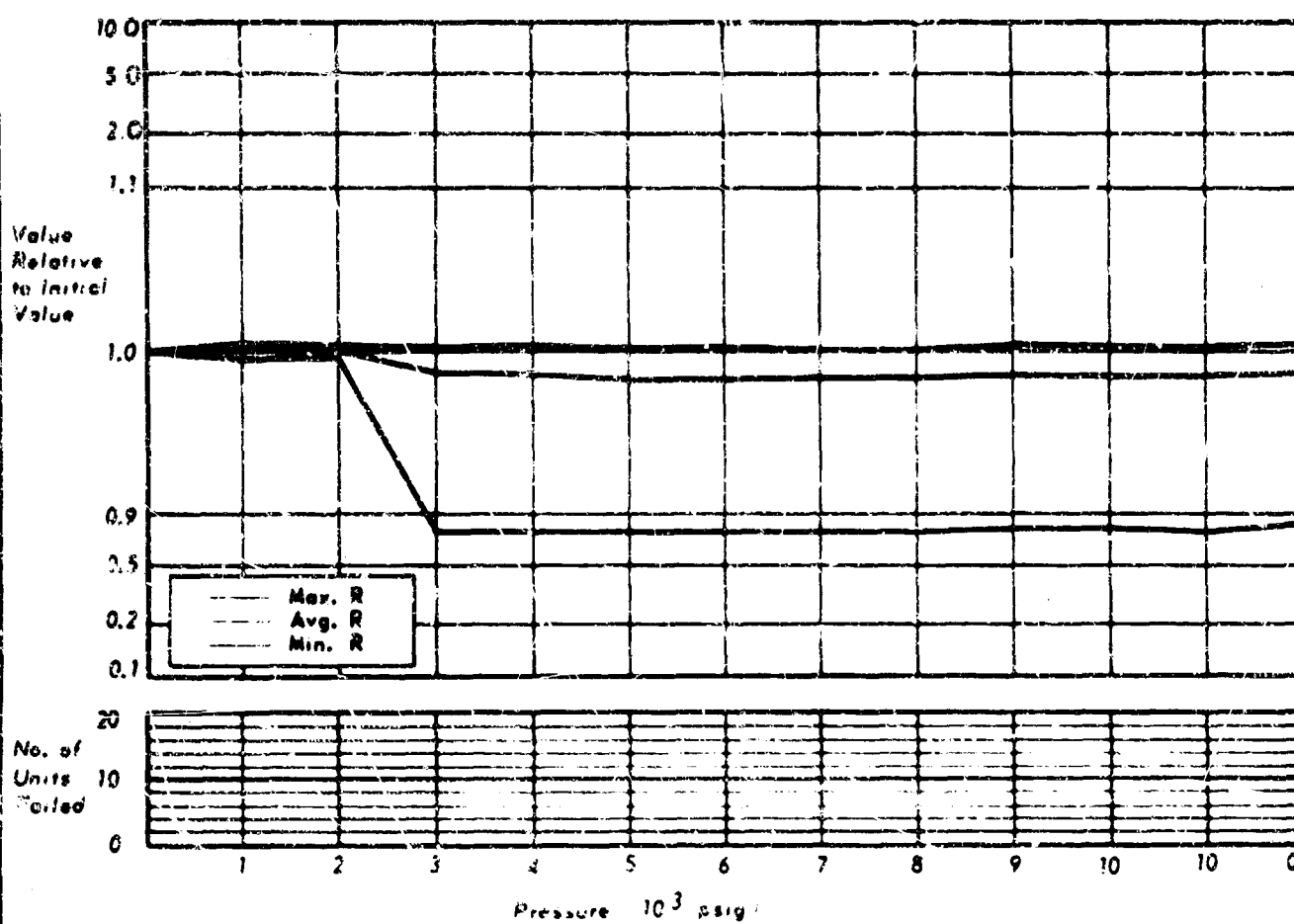
1 M Ω	5
--------------	---

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

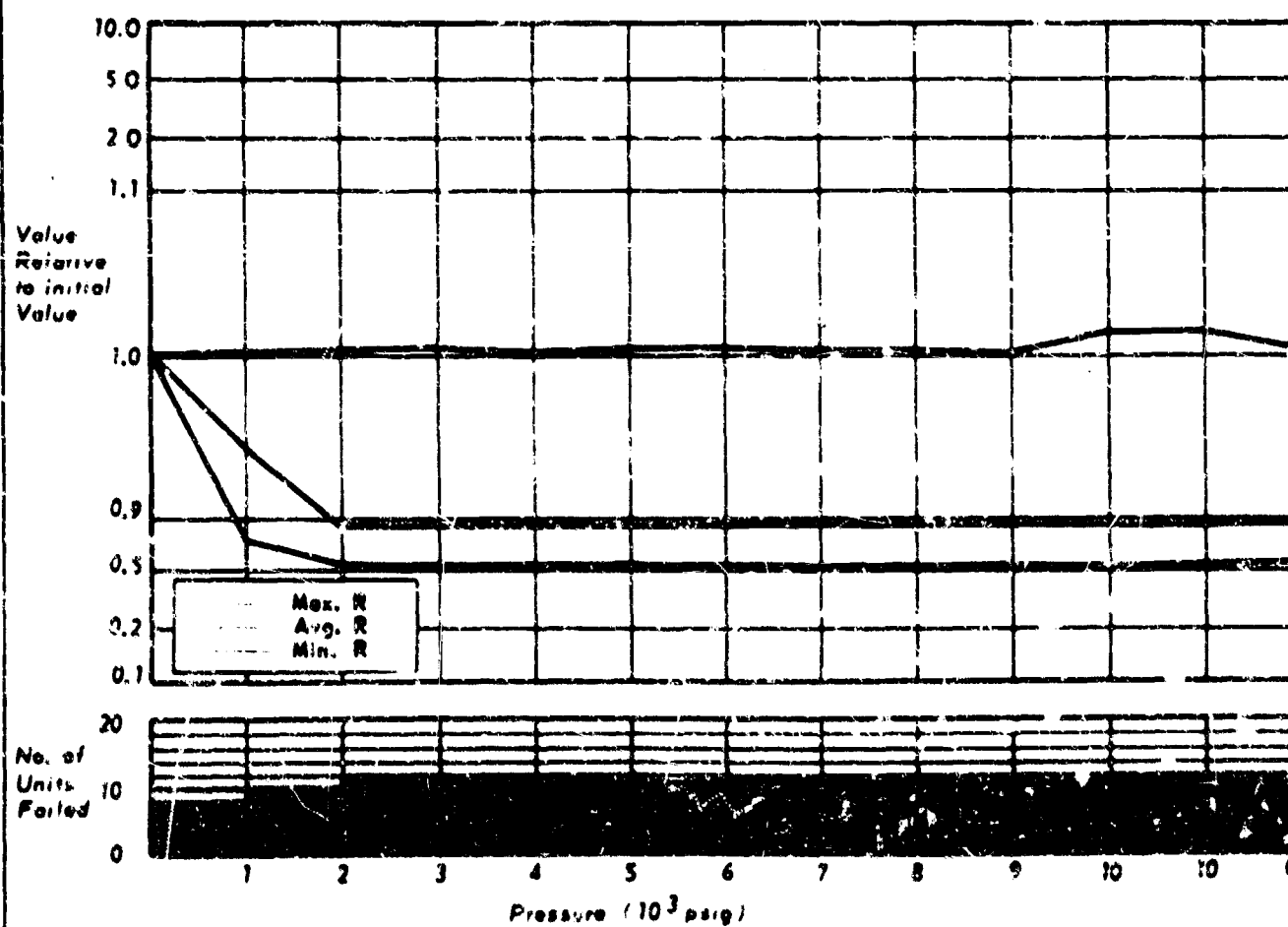
MFG. GENERAL INSTRUMENT
 TYPE - RESISTOR
 DESCRIPTION - SIR-10

CHART NO. 113
 NO. OF SAMPLES TESTED - 20



MFG. GENERAL INSTRUMENT
 TYPE - RESISTOR
 DESCRIPTION - SIR-5

CHART NO. 114
 NO. OF SAMPLES TESTED - 20



General Instruments

R10

Resistor

$20\text{ K} \pm 0.02\%$

0.5 W

Wire wound

Sealed, metal cap

Tubular, axial lead

0.45 x 0.28" diam.

SOAK PERIOD: 16 hours at 9,000 psig.

MECHANICAL: Visual inspection after completion of test showed the metal caps of two components were deformed and the end seal of one component cracked and separated from the case. All damaged units functioned normally through the entire test program.

ELECTRICAL: Nineteen components indicated less than 10% change. One component indicated less than 50% and greater than 10% change.

50



General Instruments

R5

Resistor

$5\text{ K} \Omega \pm 0.05\%$

0.5 W

Wire wound

Sealed, metal cap

Pill box, parallel lead

0.30 x 0.34" diam.

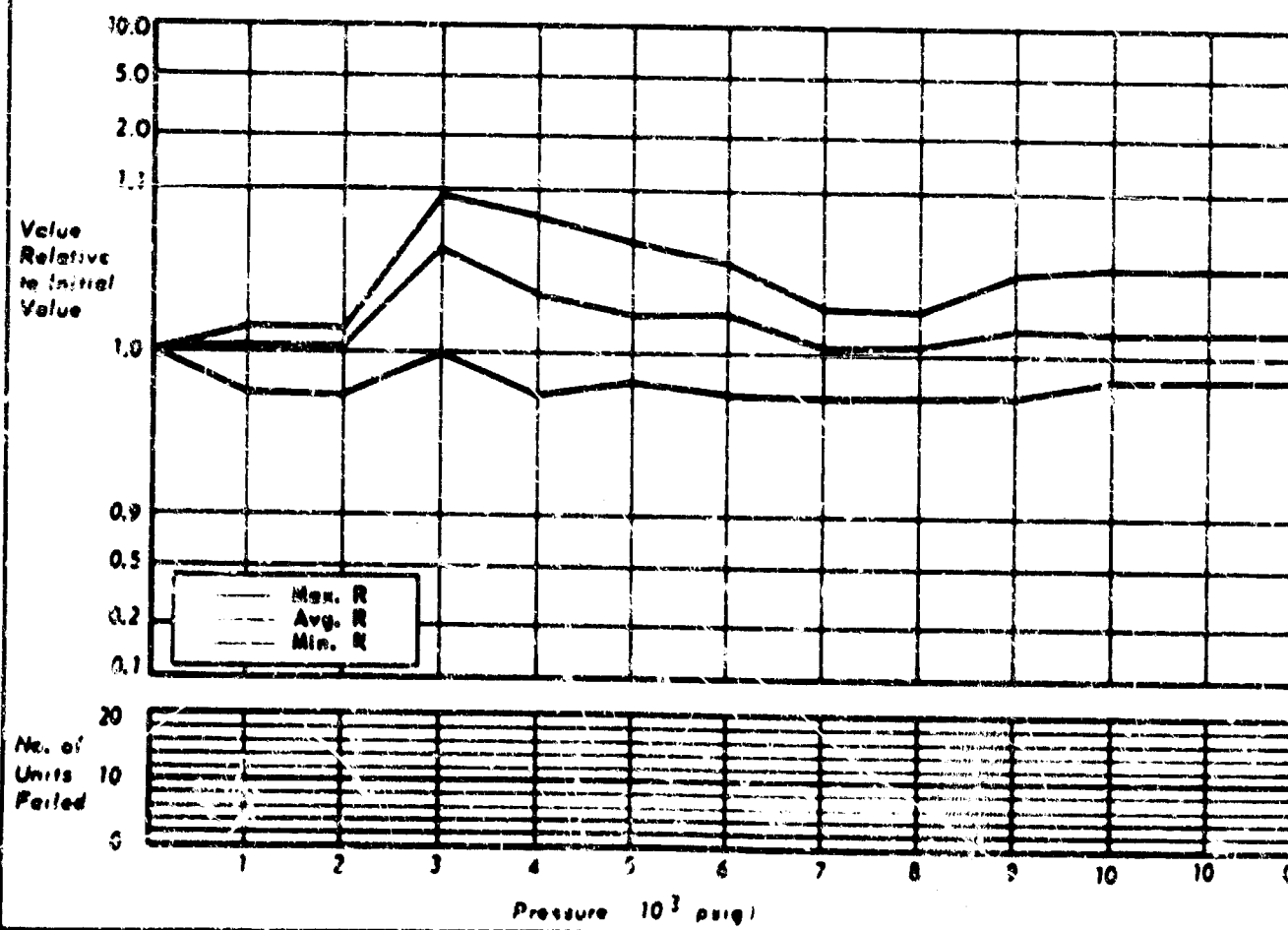
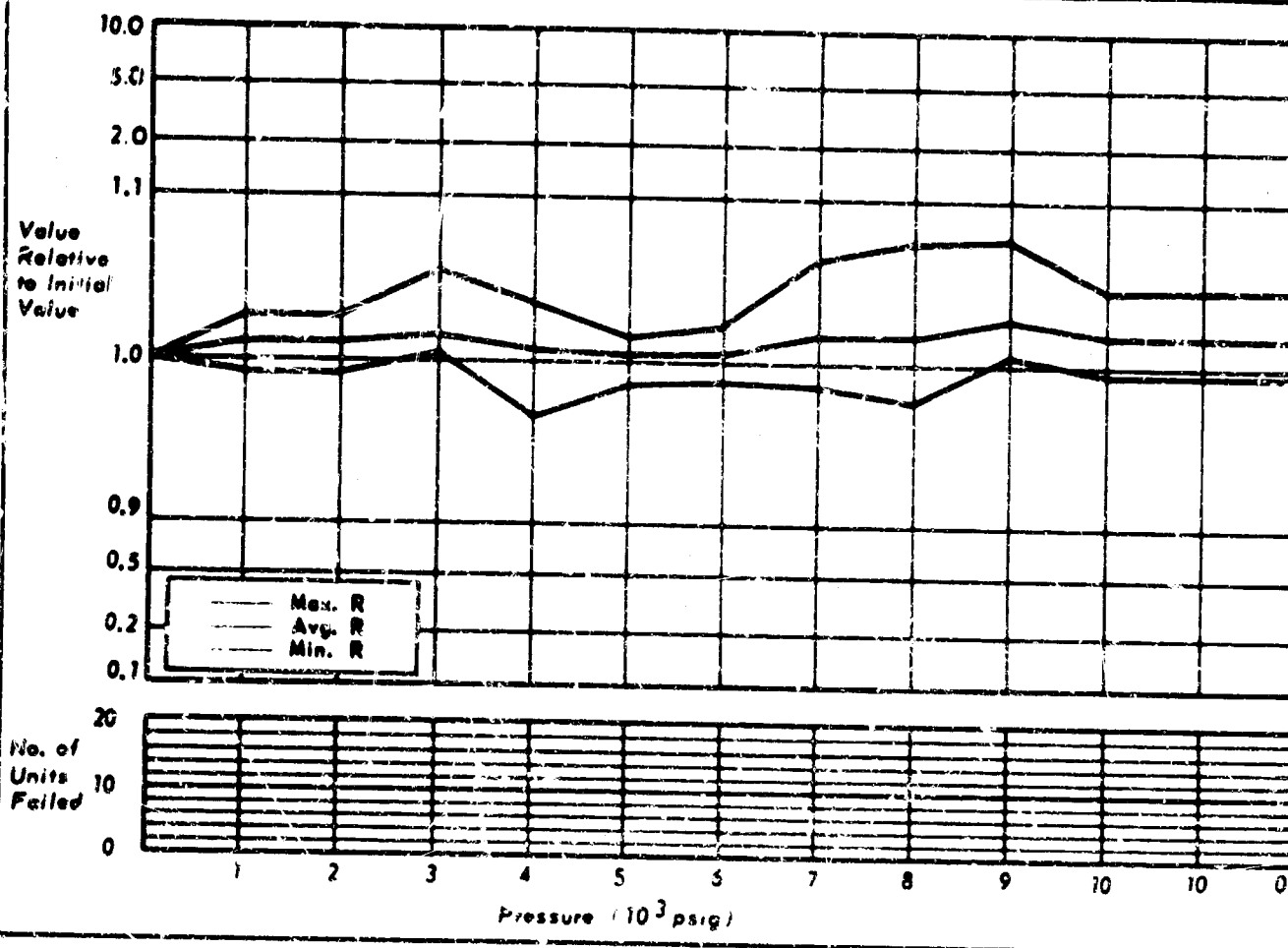
SOAK PERIOD: 16 hours at 9,000 psig.

MECHANICAL: Visual inspection after completion of test showed the top of all metal caps were deformed.

ELECTRICAL: Four components varied less than 5% and two varied more than 30% and less than 50%.

FAILURES: Thirteen components indicated a change greater than 50%.





Ohmite
884-1A
Resistor
SOAK PERIOD: None
MECHANICAL: No apparent damage.
ELECTRICAL: All components indicated less than 10% change.

$4 \Omega \pm 1\%$
1.5 W

Wire wound, silicon mold
Tubular, axial lead
0.406 x 0.125" diam.

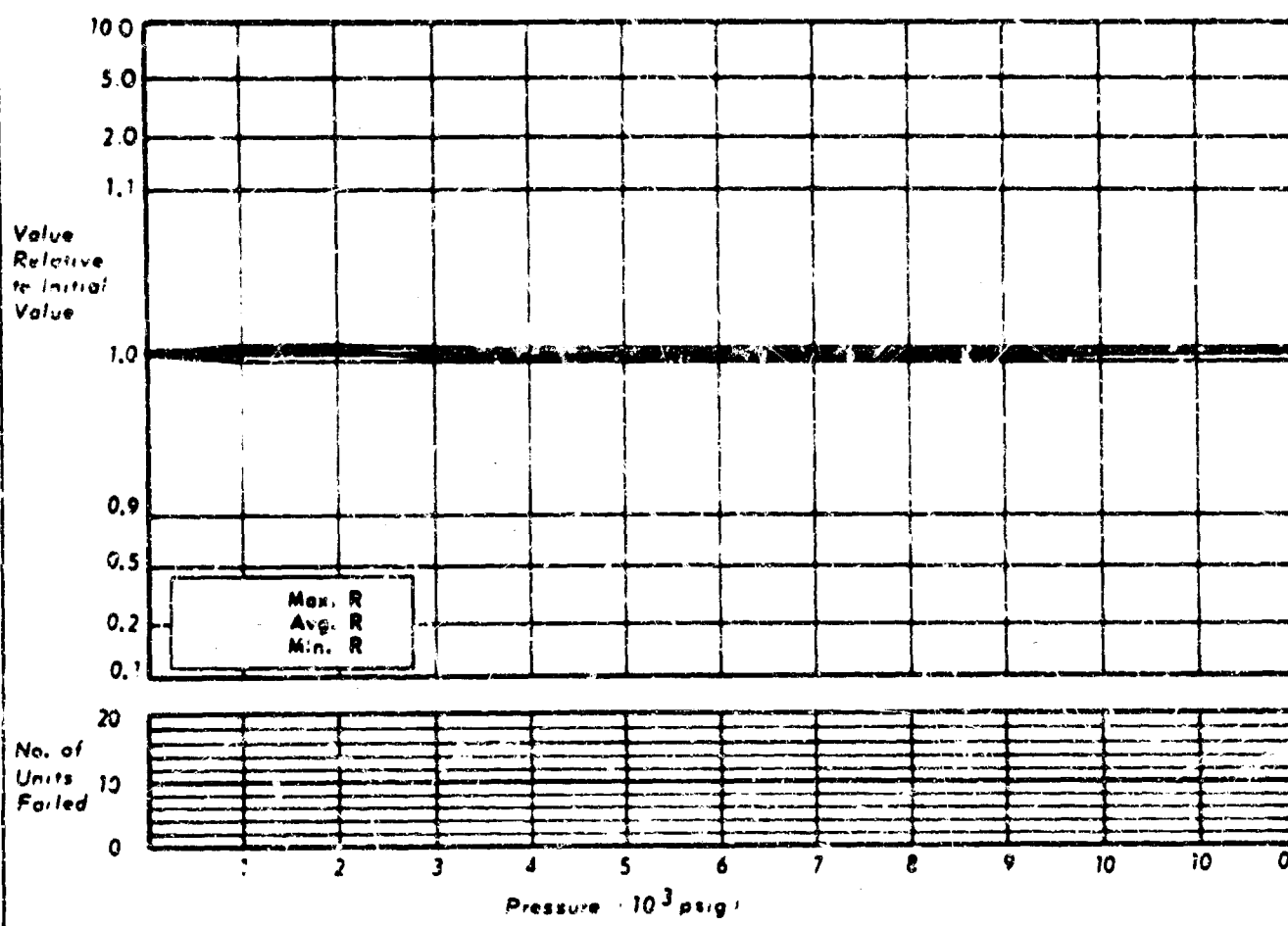
Ohmite
884-5
Resistor
SOAK PERIOD: None
MECHANICAL: No apparent damage.
ELECTRICAL: All components indicated less than 10% change.

$5 \Omega \pm 5\%$
5 W

Wire wound, silicon mold
Tubular, axial lead
0.875 x 0.34" diam.

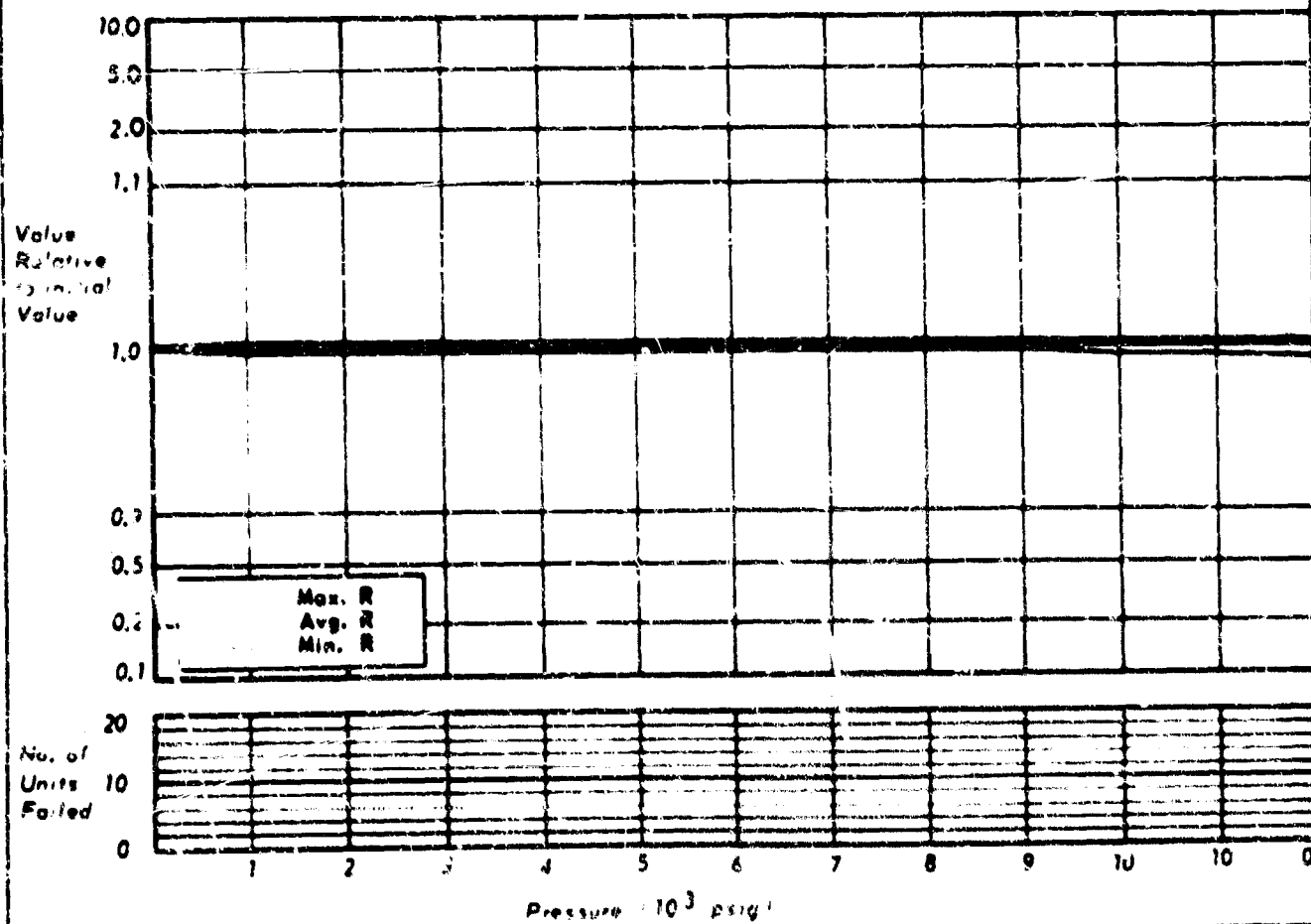
MFG. - SHMITE
TYPE - RESISTOR
DESCRIPTION - 881-II

CHART NO. 117
NO. OF SAMPLES TESTED - 18



MFG. - SHMITE
TYPE - RESISTOR
DESCRIPTION - 882-1A

CHART NO. 118
NO. OF SAMPLES TESTED - 18



Ohmite
881-11
Resistor
SOAK PERIOD: None
MECHANICAL: No apparent damage.
ELECTRICAL: All components indicated less than 10% change.

$14 \Omega \pm 3\%$
11W

Wire wound, silicon mold
Tubular, axial lead
1.312 x 0.625" diam.

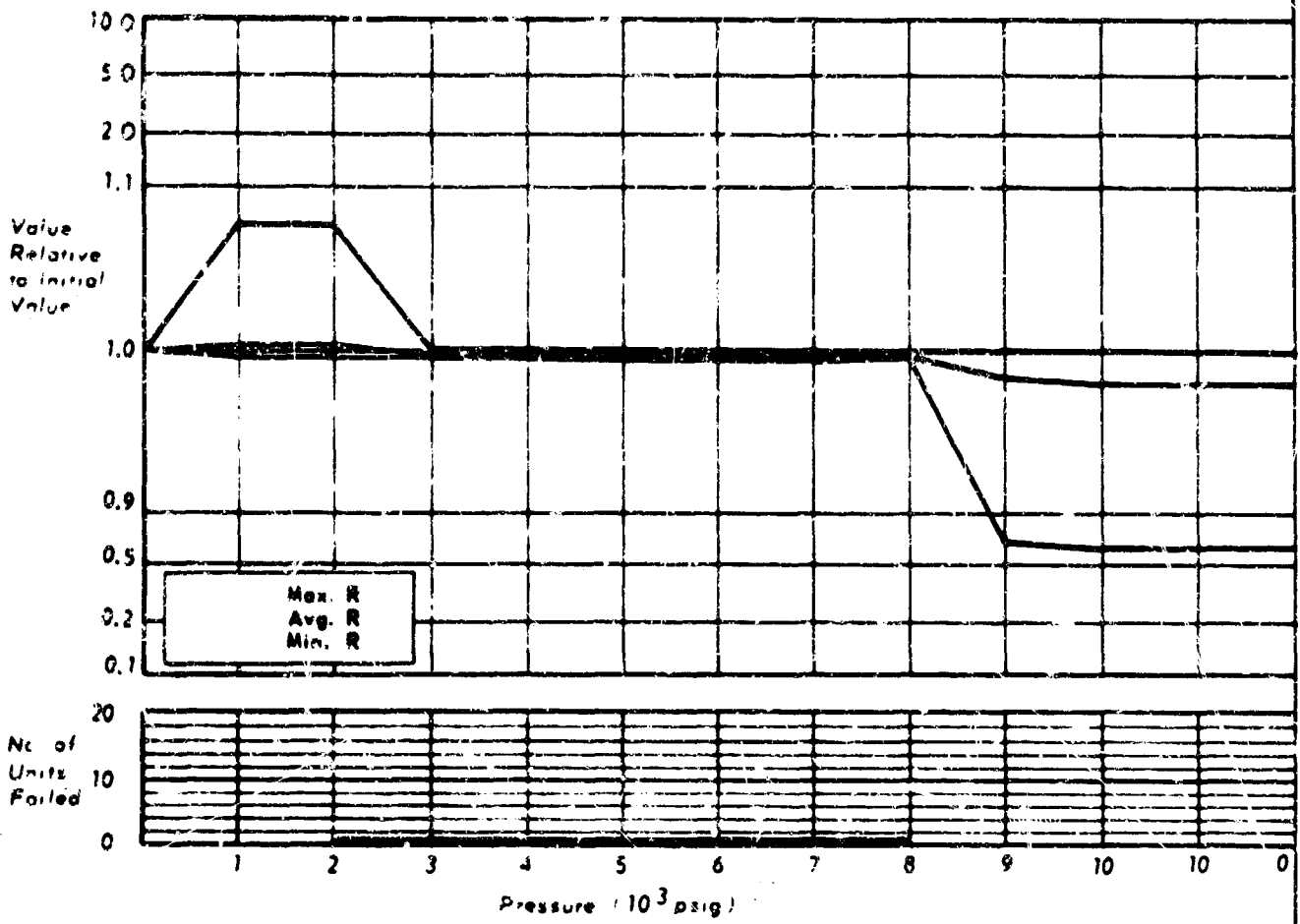
Ohmite
882-1A
Resistor
SOAK PERIOD: None
MECHANICAL: No apparent damage.
ELECTRICAL: All components indicated less than 10% change.

$2.5 K\Omega \pm 3\%$
1 W

Wire wound, silicon mold
Tubular, axial lead
0.436 x 0.125" diam.

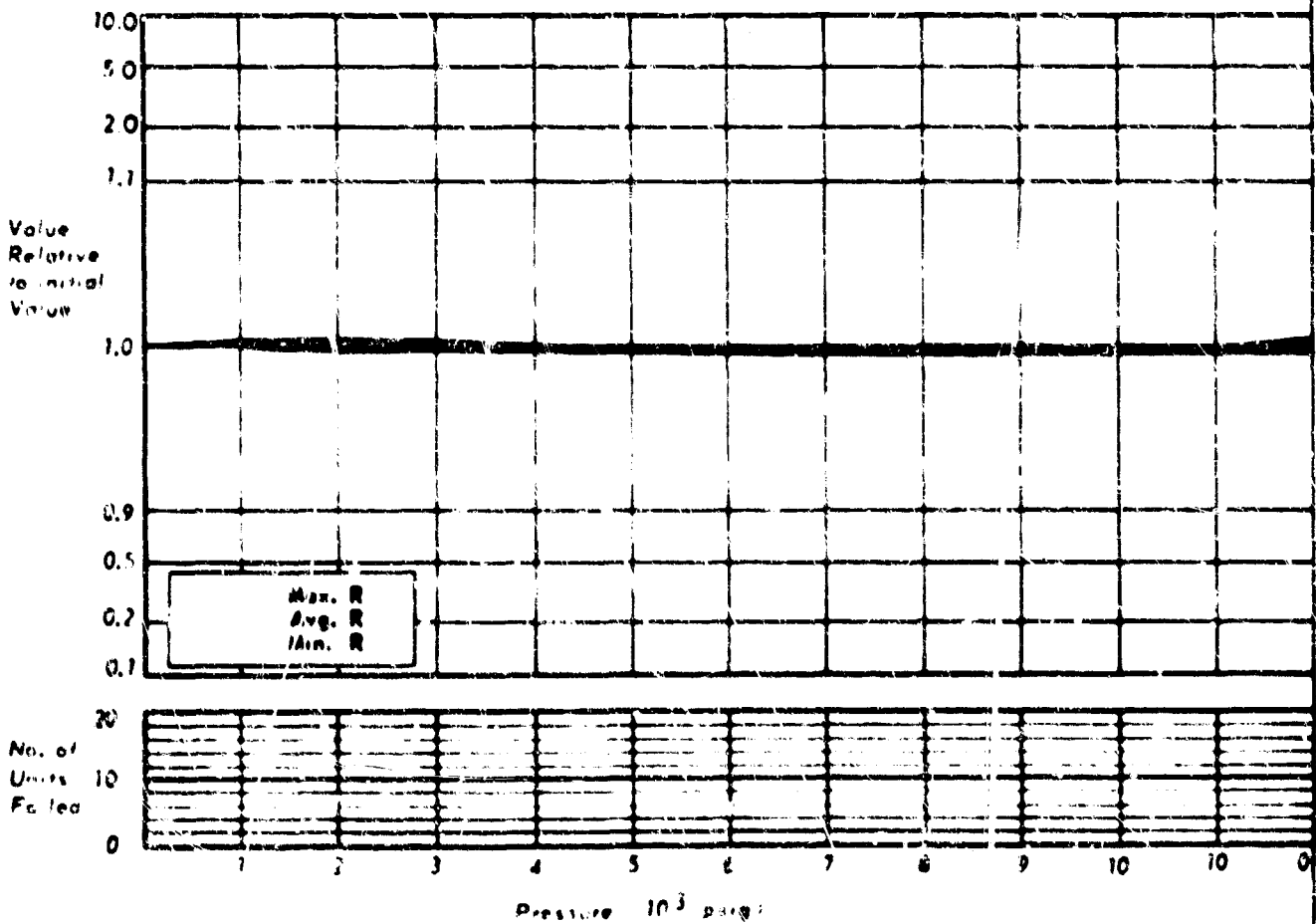
MFG. - OHMITE
 TYPE - RESISTOR
 DESCRIPTION - 884-8

CHART NO. 119
 NO. OF SAMPLES TESTED - 20



MFG. - OHMITE
 TYPE - RESISTOR
 DESCRIPTION - 884-10

CHART NO. 120
 NO. OF SAMPLES TESTED - 20



Ohmite	51.1 K Ω $\pm$ 1%	Wire wound silicon mold
884-5	5 W	Tubular, axial lead
Resistor		0.875 x 0.34" diam.

SOAK PERIOD: None

MECHANICAL: No apparent damage.

ELECTRICAL: Nineteen components indicated less than 10% change.

FAILURES: One component indicated a change greater than 50% with subsequent recovery to less than 50% at the pressures shown on the failure graph on facing page.

Ohmite	84.5 K Ω $\pm$ 1%	Wire wound, silicon mold
884-10	5 W	Tubular, axial lead
Resistor		1.312 x 0.625" diam.

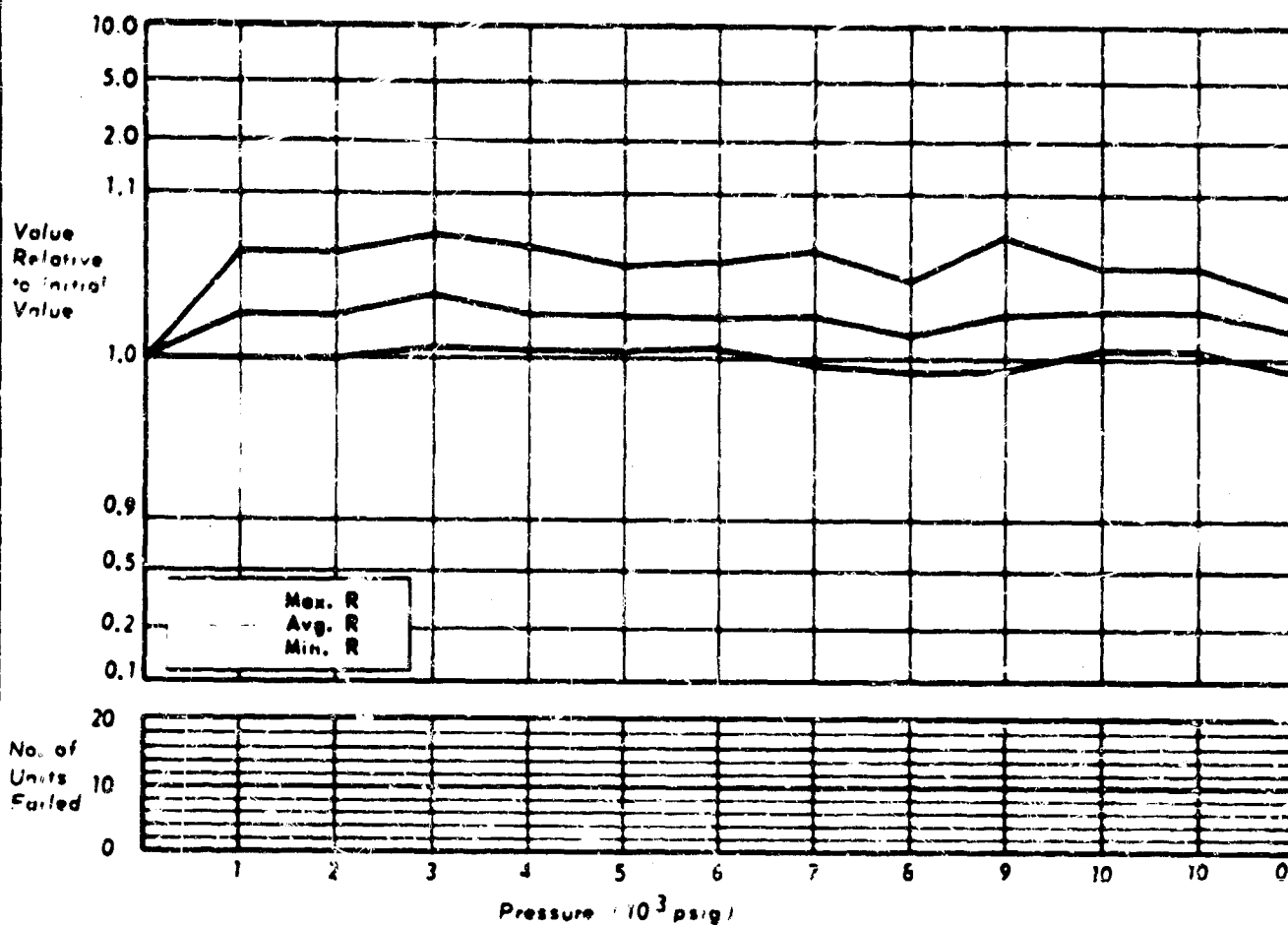
SOAK PERIOD: 15.9 hours at 10,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: Twenty components indicated less than 10% change.

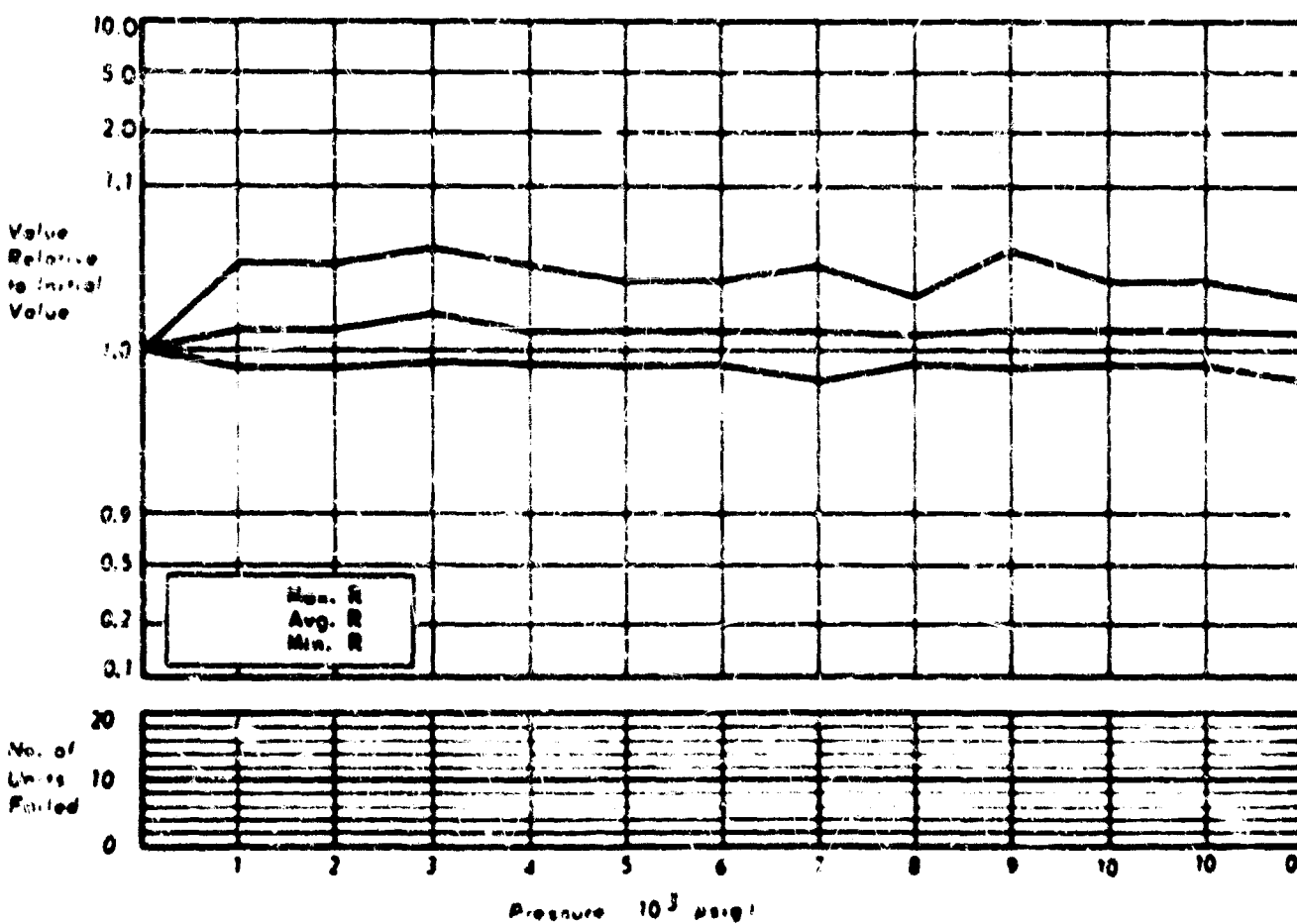
MFG. - OHMITE
 TYPE - RESISTOR
 DESCRIPTION - 888-98

CHART NO. 121
 NO. OF SAMPLES TESTED - 20



MFG. - OHMITE
 TYPE - RESISTOR
 DESCRIPTION - 888-10A

CHART NO. 122
 NO. OF SAMPLES TESTED - 10



Ohmite $5 \Omega \pm 5\%$
995-58 5 W
Resistor
SOAK PERIOD: None
MECHANICAL: No apparent damage.
ELECTRICAL: All components indicated less than 10% change.

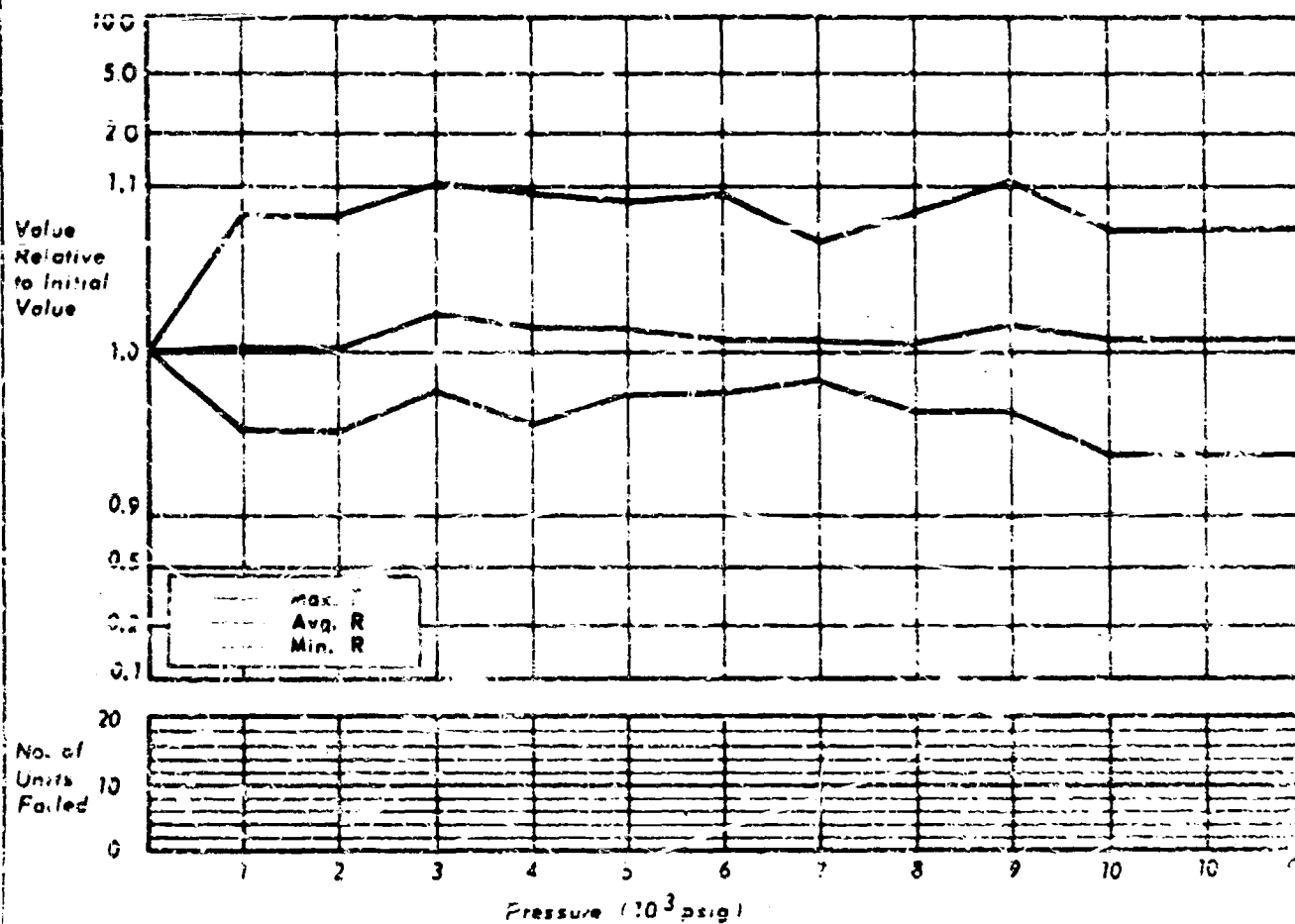
Wire wound, vitreous mold
Tubular, axial lead
0.875 x 0.218" diam.

Ohmite $5 \Omega \pm 5\%$
995-10A 10W
Resistor
SOAK PERIOD: None
MECHANICAL: No apparent damage.
ELECTRICAL: All components indicated less than 10% change.

Wire wound, vitreous mold
Tubular, axial lead
1.25 x 0.312" diam.

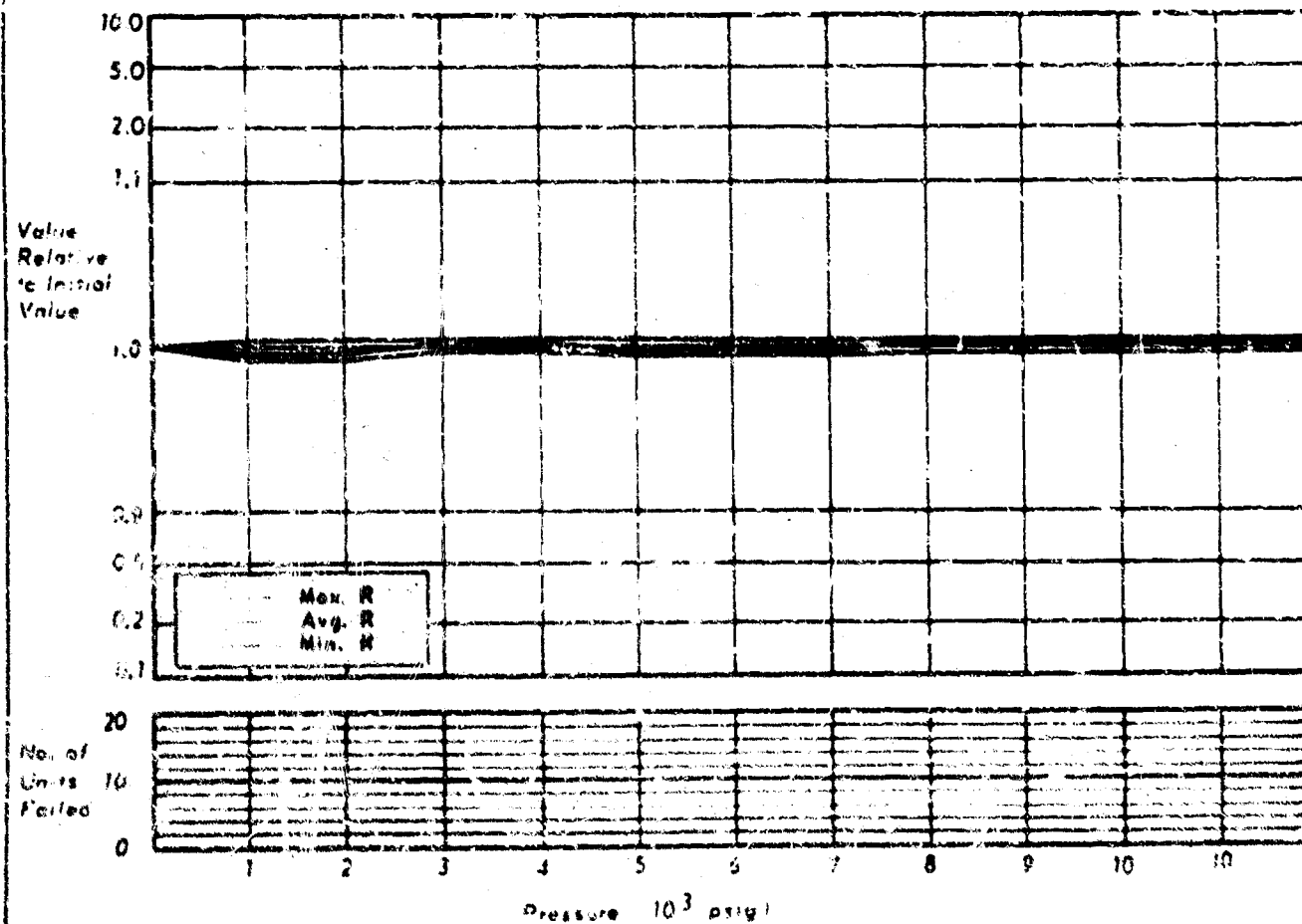
MFG.-OHNITE
 TYPE-RESISTOR
 DESCRIPTION-ESS-1A 500

CHART NO. 123
 NO. OF SAMPLES TESTED-20



MFG.-OHNITE
 TYPE-RESISTOR
 DESCRIPTION-ESS-1A 5000

CHART NO. 124
 NO. OF SAMPLES TESTED-20



Ohmite $5 \Omega \pm 5\%$
995.1A 1.5 W
Resistor
SOAK PERIOD: None
MECHANICAL: No apparent damage.
ELECTRICAL: All components indicated less than 10% change.

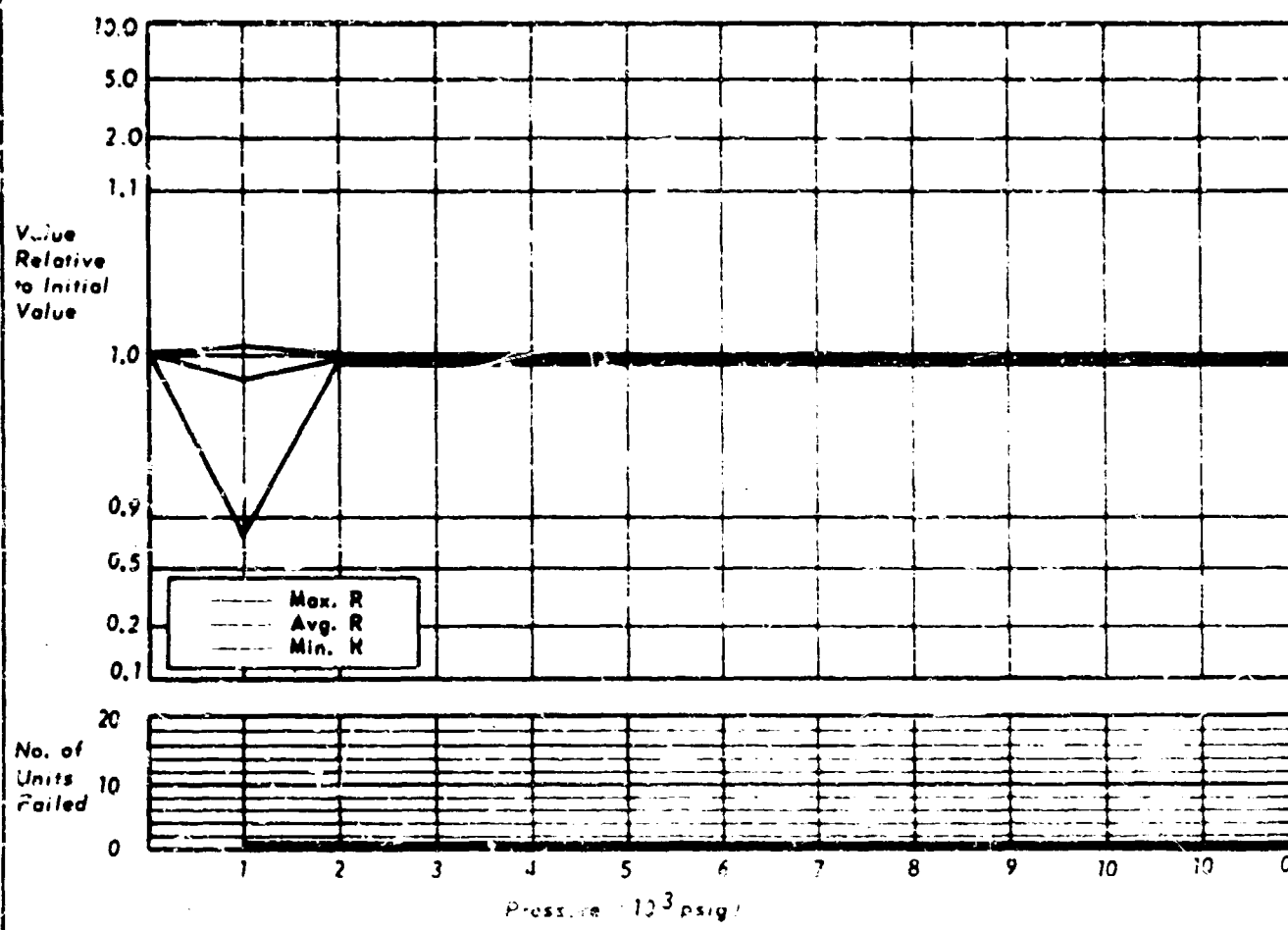
Wire wound, vitreous mold
Tubular, axial lead
0.406 x 0.125" diam.

Ohmite $3.0 K\Omega \pm 5\%$
995.1A 1.5 W
Resistor
SOAK PERIOD: None
MECHANICAL: No apparent damage.
ELECTRICAL: All components indicated less than 10% change.

Wire wound, vitreous mold
Tubular, axial lead
0.406 x 0.125" diam.

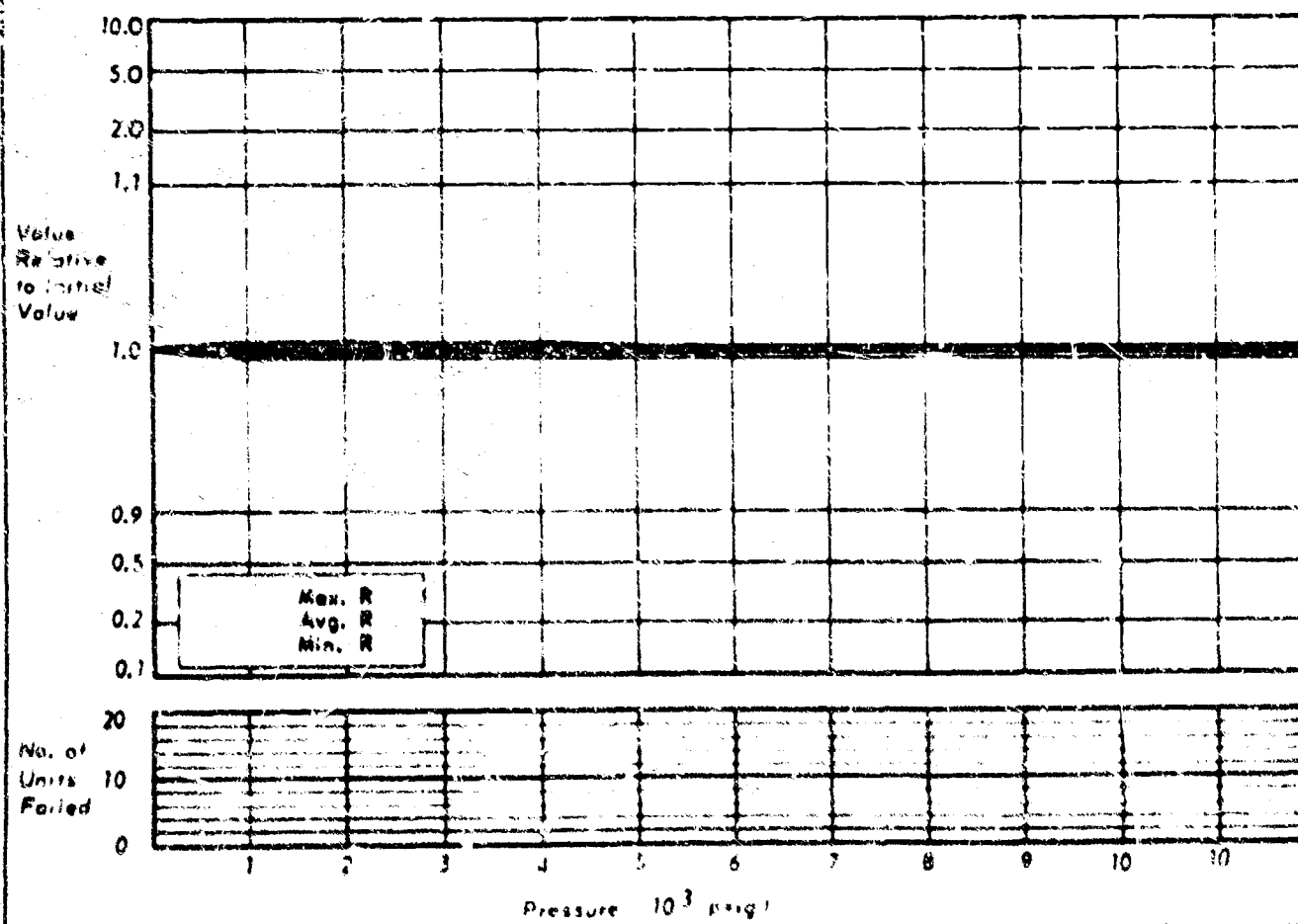
MFG.-OHMITE
TYPE-RESISTOR
DESCRIPTION-998-58

CHART NO. 125
NO. OF SAMPLES TESTED-20



MFG.-OHMITE
TYPE-RESISTOR
DESCRIPTION-998-10A

CHART NO. 126
NO. OF SAMPLES TESTED-20



Ohmite
995-5B
Resistor
SOAK PERIOD: 16 hours at 10,000 psig.
MECHANICAL: No apparent damage.
ELECTRICAL: All components indicated less than 10% change.

20.0 K Ω $\pm$ 5%
5W

Wire wound, vitreous
Tubular, axial lead
0.375 x 0.218" diam

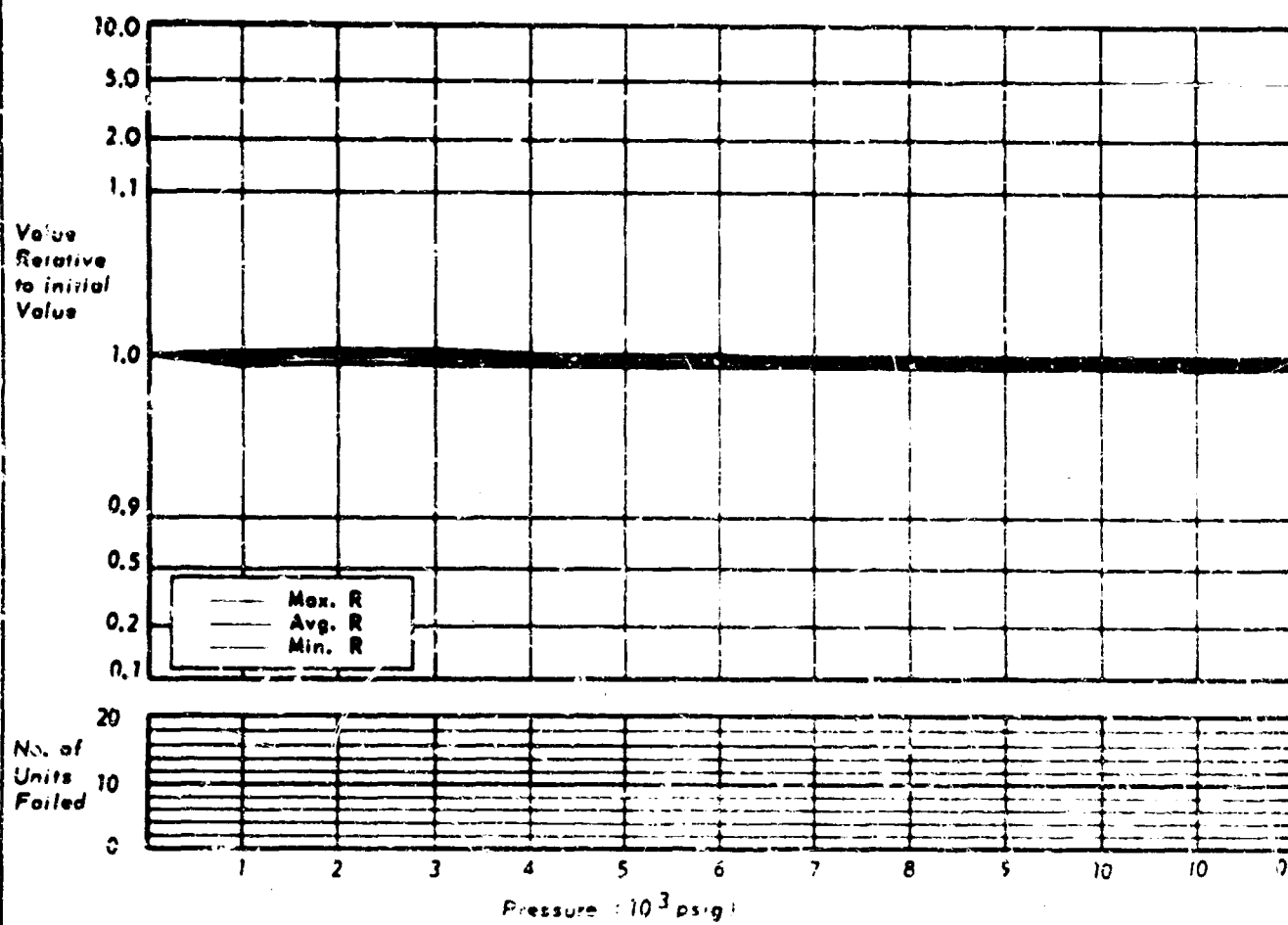
Ohmite
995-10A
Resistor
SOAK PERIOD: None
MECHANICAL: No apparent damage.
ELECTRICAL: All components indicated less than 10% change.

20.0 K Ω $\pm$ 5%
10W

Wire wound, vitreous
Tubular, axial lead
1.25 x 0.512" diam.

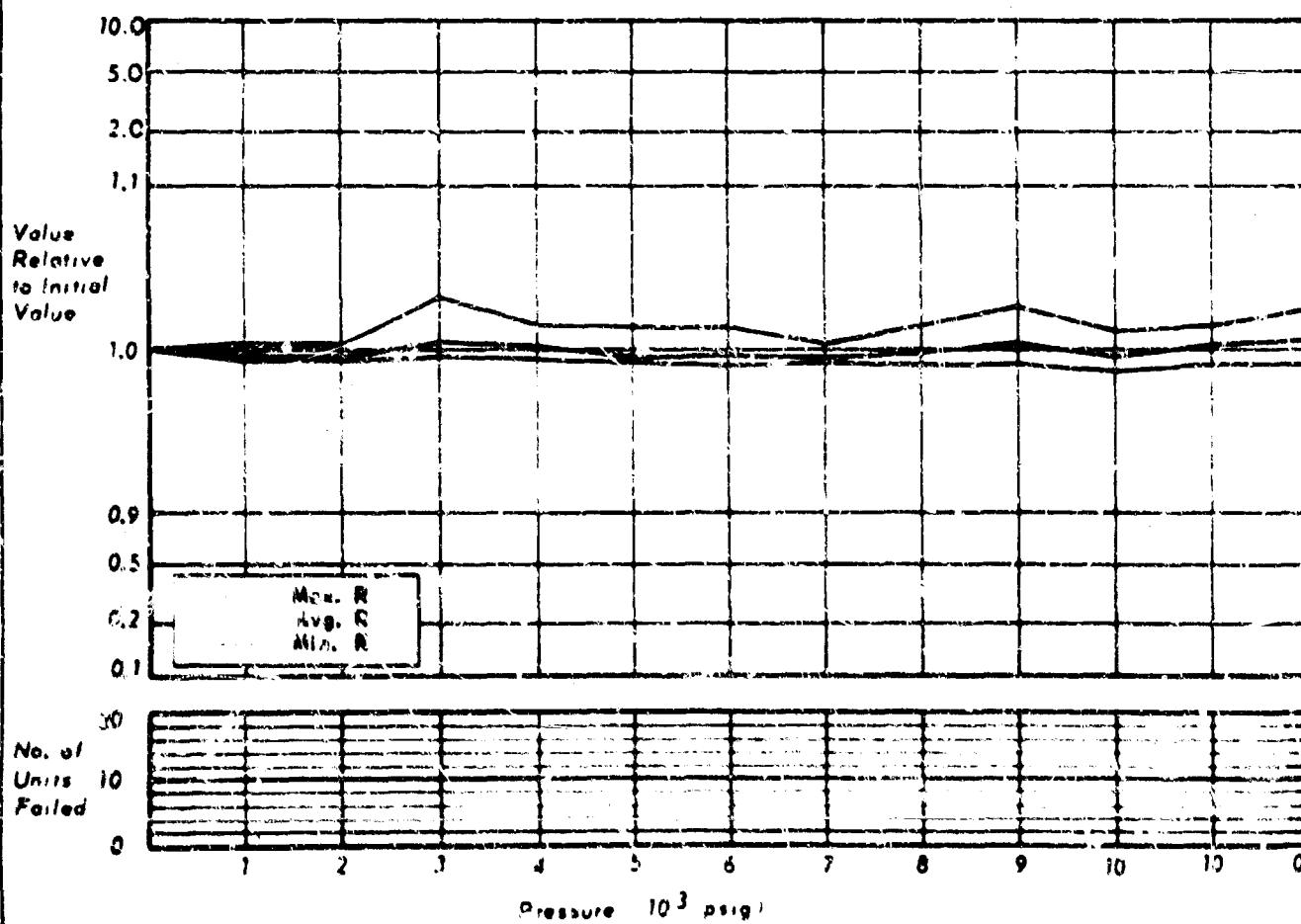
MFG. - TEXAS INSTRUMENT
 TYPE - RESISTOR
 DESCRIPTION - NM80

CHART NO. 127
 NO. OF SAMPLES TESTED - 20



MFG. - TEXAS INSTRUMENT
 TYPE - RESISTOR
 DESCRIPTION - CR 1/4 102

CHART NO. 128
 NO. OF SAMPLES TESTED - 10



Texas Instruments

100 & 100 K $\Omega \pm 1\%$

Metal film, molded

MM40

0.125 W

Tubular, axial lead

Resistor

0.4 x 0.135" diam

NOTE: Ten components of each of the two resistance values shown were submitted and tested as a set of twenty.

SOAK PERIOD: 15.5 hours at 10,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

Texas Instruments

110 Ω

Carbon film, epoxy encaps

CR 14

0.125 W

Tubular, axial lead

Resistor

0.375 x 0.103" diam.

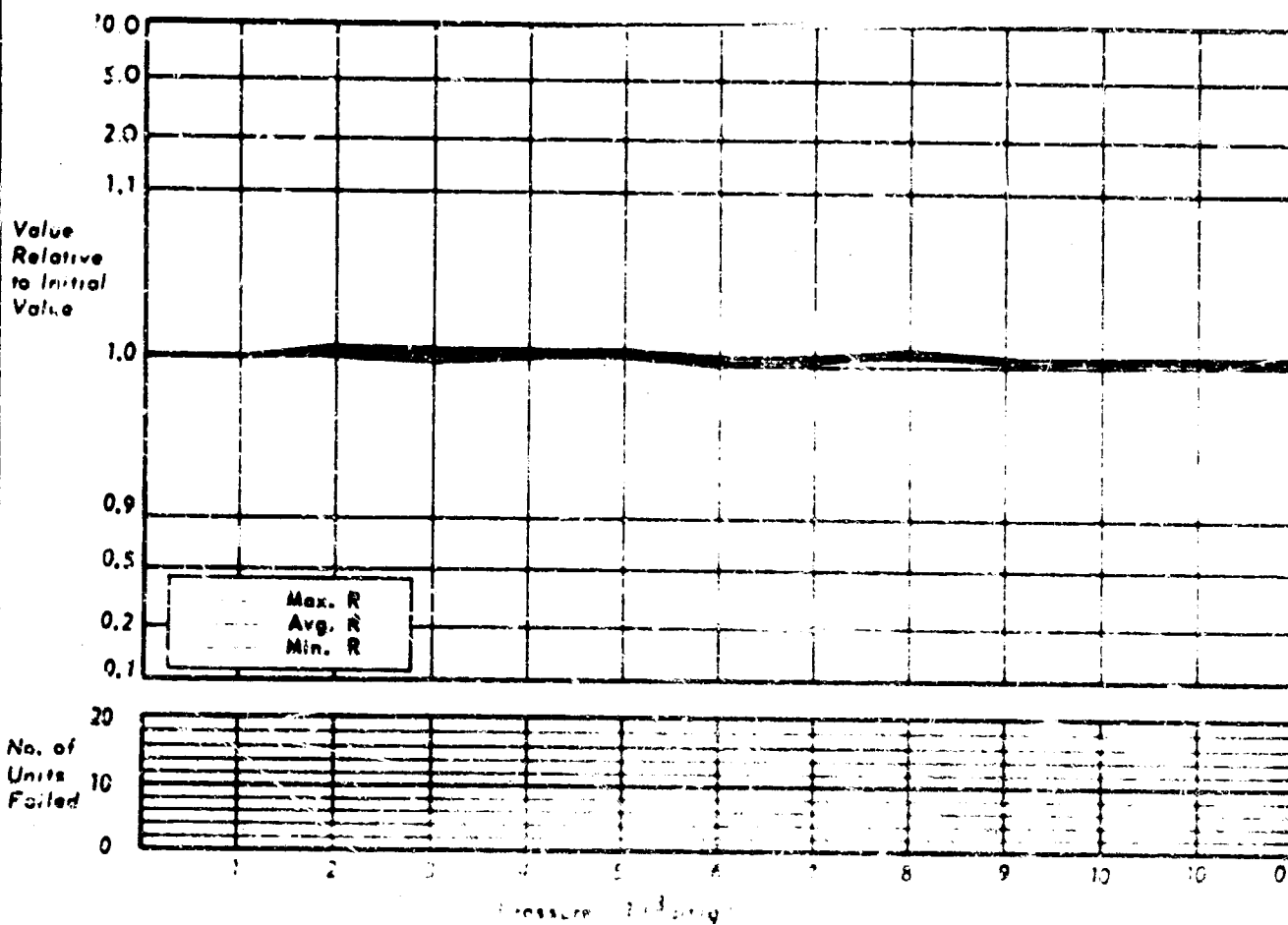
SOAK PERIOD: 15.5 hours at 10,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

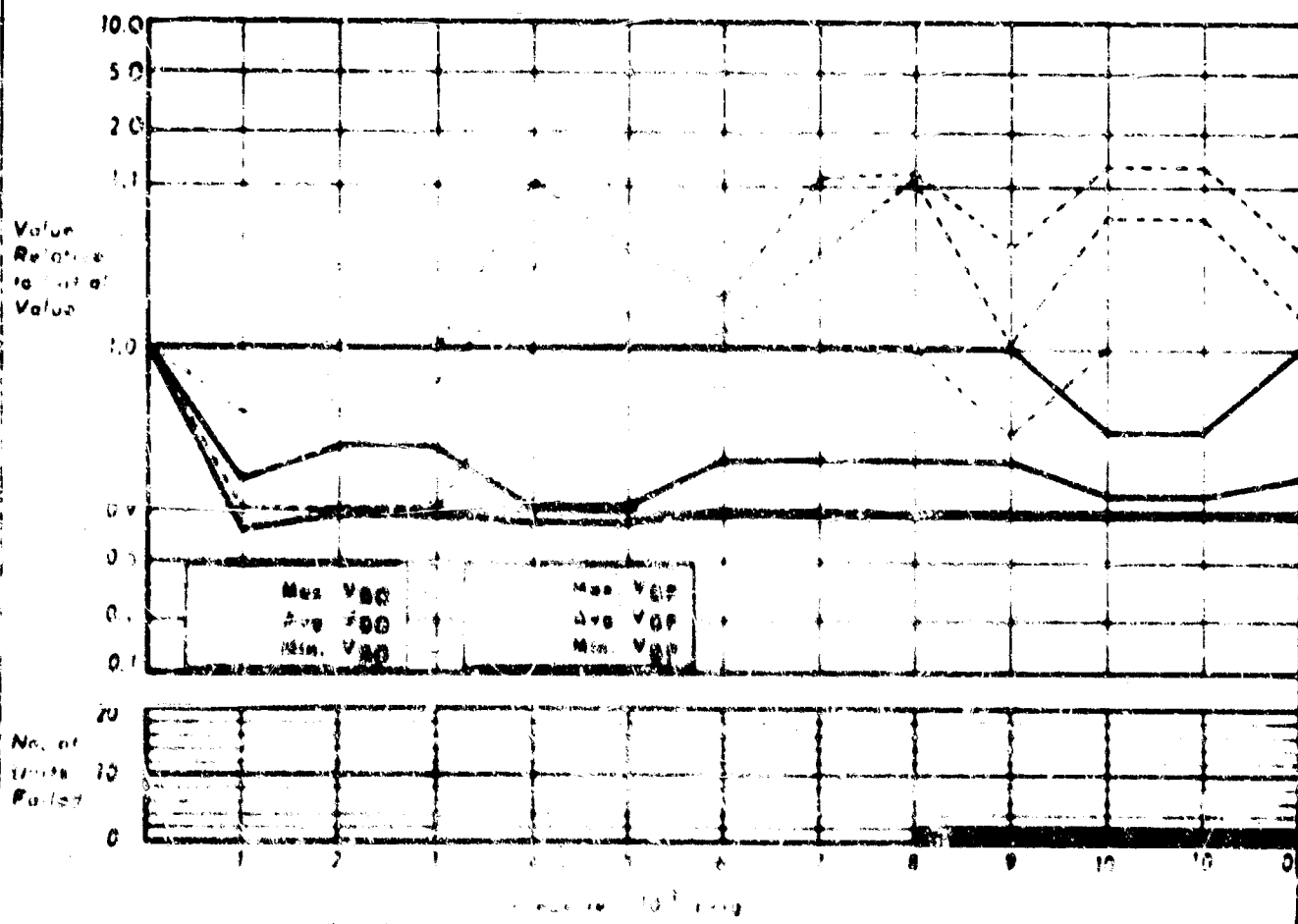
KPG-TEP-48 INSTRUMENT
 TYPE-RESISTOR
 DESCRIPTION-CR 1/4

CHART NO. 129
 NO. OF SAMPLES TESTED-10



MFG.-MOTOROLA
 TYPE-SILICON CONTROLLED RECTIFIER
 DESCRIPTION-2N652

CHART NO. 130
 NO. OF SAMPLES TESTED-15



Texas Instruments

100 KΩ

Carbon film, epoxy encaps

CR ¼

0.25 W

Tubular, axial lead

Resistor

0.275 x 0.105" diam.

SOAK PERIOD: 15.5 hours at 10,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 1% change.

Motorola

5A PRV

Silicon, diffused junction

2N682

25 A rms

Welded cap, stud mount

Silicon controlled rectifier

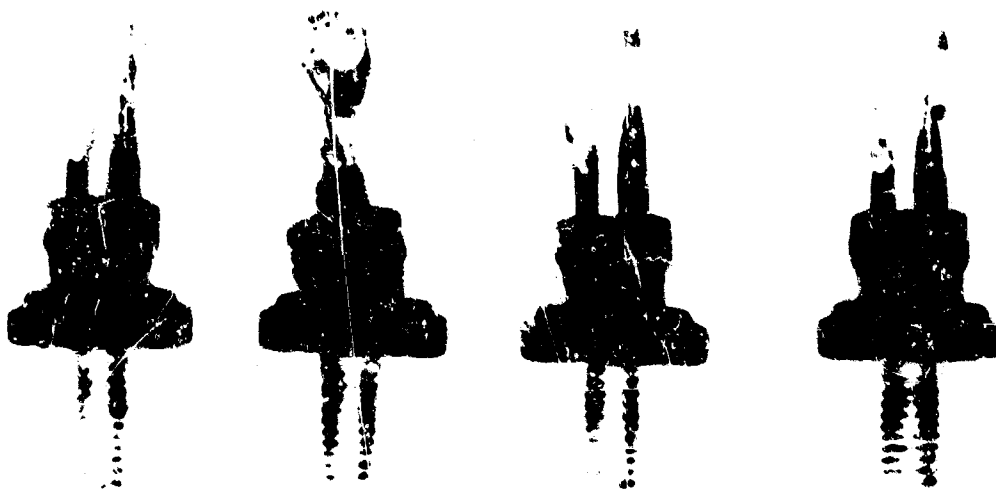
0.95 x 0.56" diam.

SOAK PERIOD: None

MECHANICAL: Visual inspection after completion of testing showed deformed cases on three components.

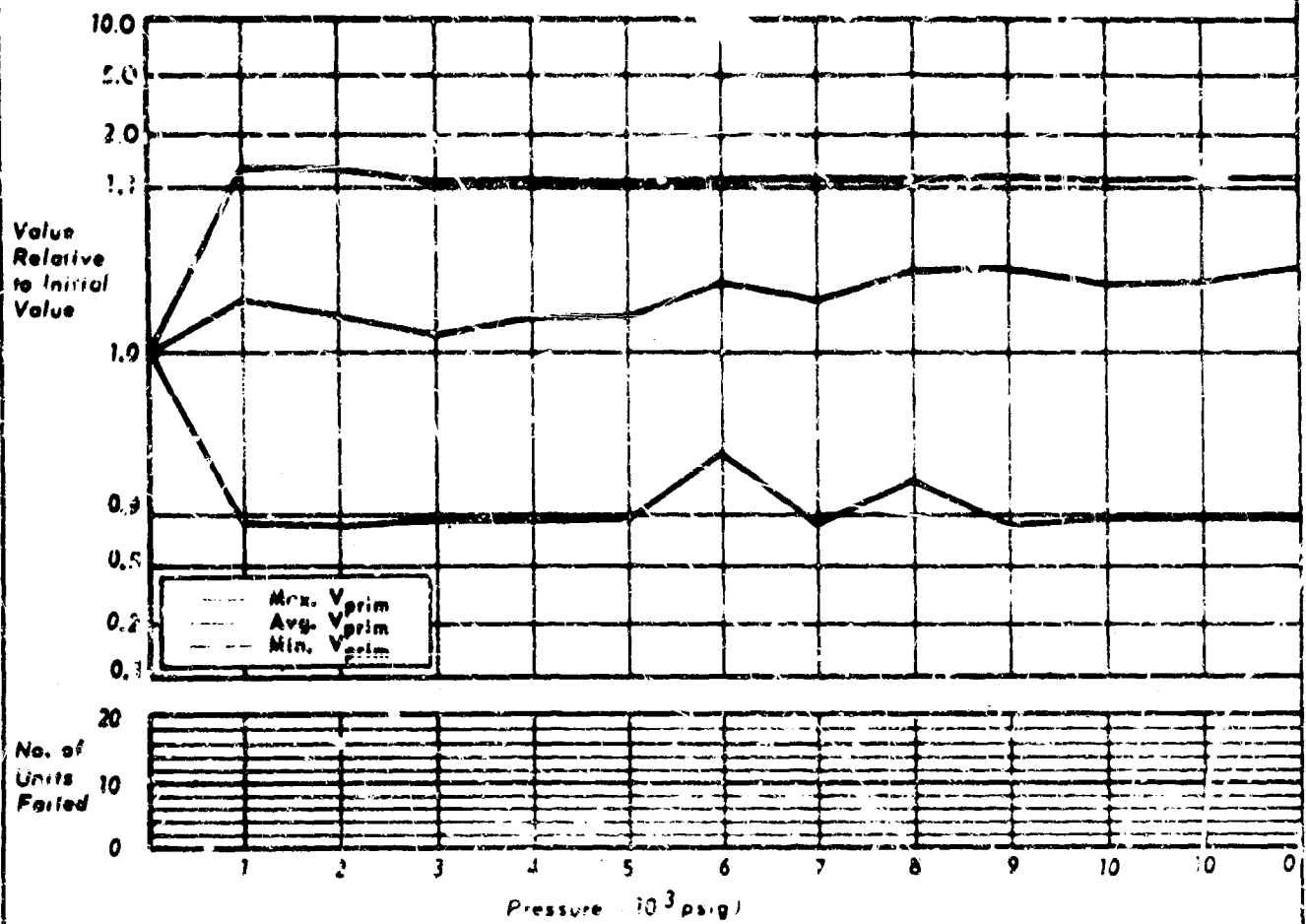
ELECTRICAL: Two components indicated less than 10% change. One component indicated greater than 10% and less than 25% change.

FAILURES: Two components failed above 0.001 psig.



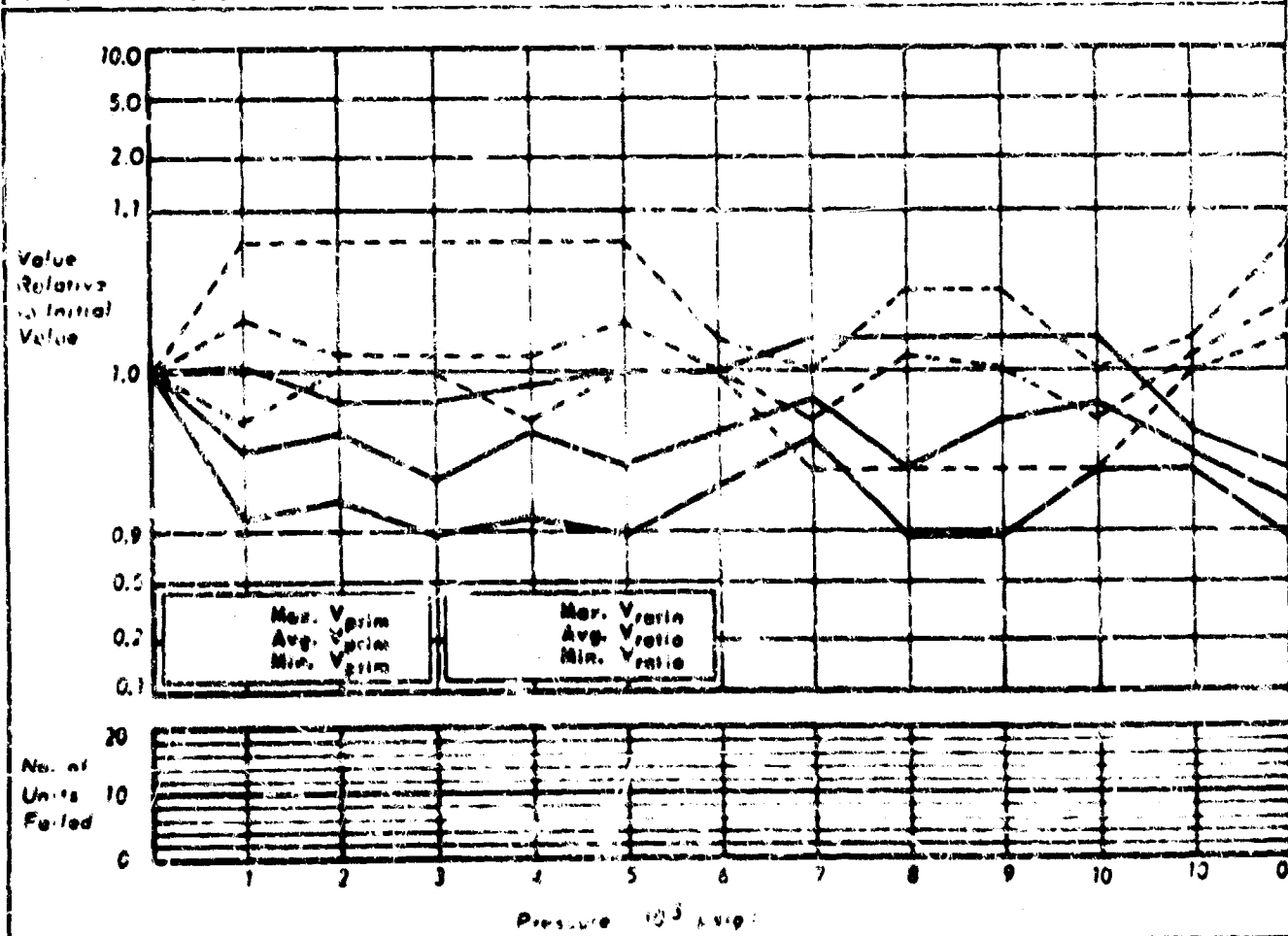
MFG. GENERAL INSTRUMENTS
 TYPE - TRANSFORMER
 DESCRIPTION - C-6240758

CHART NO. 131
 NO. OF SAMPLES TESTED - 20



MFG. MICROTRAN
 TYPE - TRANSFORMER
 DESCRIPTION - M53K

CHART NO. 132
 NO. OF SAMPLES TESTED - 3



General Instruments
P. W. Sickles Div.
CS249736

Prim. Induct. 500 μ H
Sec. Induct. 500 μ H
at 20 Mc

Adj. tuning core
Ceramic form

R. F. Transformer

SOAK PERIOD: None

MECHANICAL: No apparent damage.

ELECTRICAL: Ten components indicated less than 10% change.

Ten components indicated a change greater than 10% and less than 50%.

Microtron

MM3-M

Transformer

SOAK PERIOD: None

MECHANICAL: No apparent damage.

ELECTRICAL: Four components indicated a change greater than 10% and less than 50%.

One component indicated a change greater than 50% with subsequent recovery to less than 50% at the pressures shown on failure graph on opposite page.

Prim. Imp. 10,000

Sec. Imp. 200

Freq. resp. 150-10,000

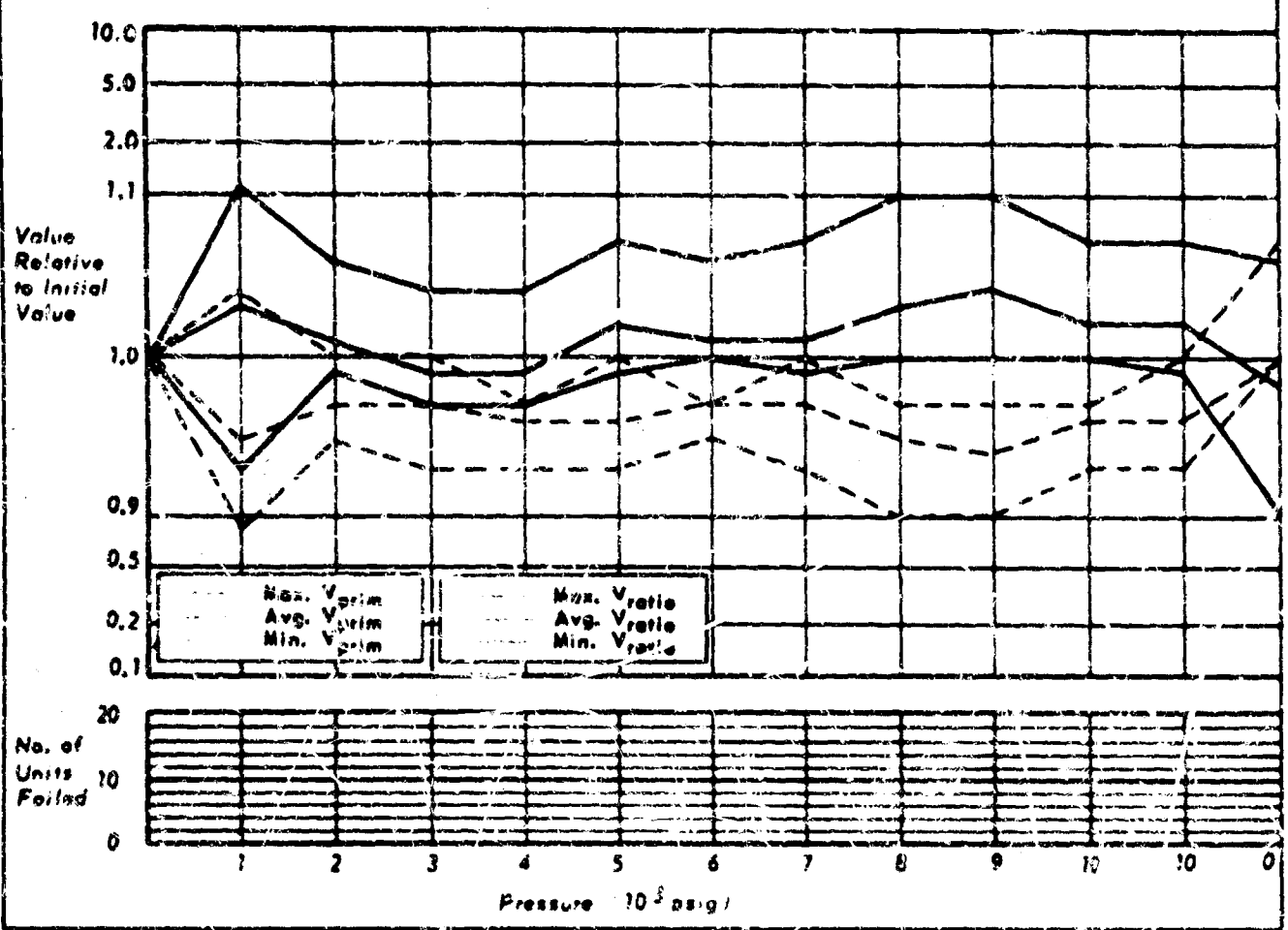
Cast epoxy

Plug in type

0.875 x 0.761 x 0.531"

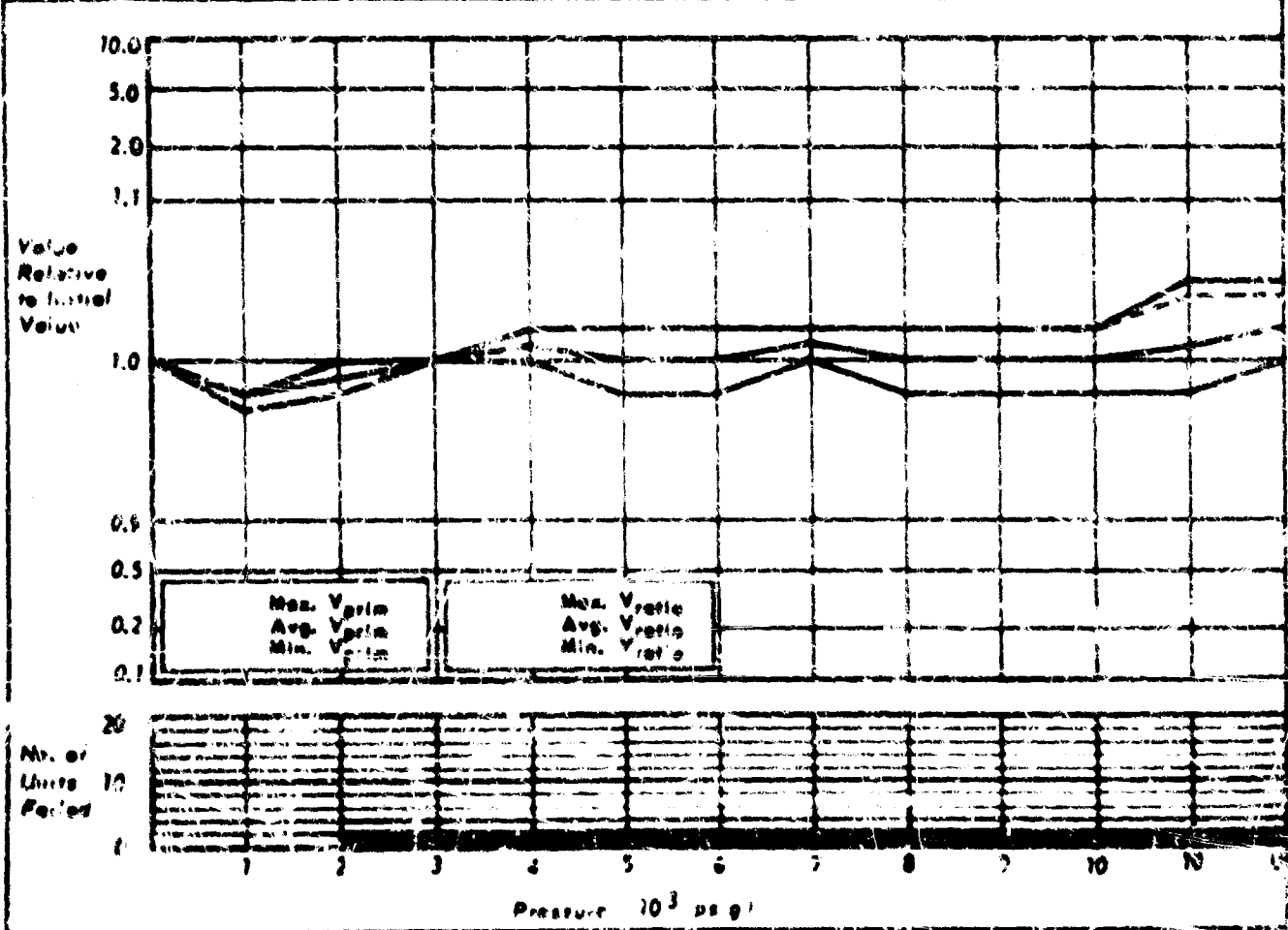
MFG. - MICROTRAN
 TYPE - TRANSFORMER
 DESCRIPTION - MM7-P8

CHART NO. 133
 NO. OF SAMPLES TESTED - 5



MFG. - MICROTRAN
 TYPE - TRANSFORMER
 DESCRIPTION - VM16M

CHART NO. 134
 NO. OF SAMPLES TESTED - 8



Microtron
MM7-FB
Transformer, output
SOAK PERIOD: None
MECHANICAL: No apparent damage.
ELECTRICAL: All components indicated less than 10% change.

Pri. Imp. 30,000
Sec. Imp. 1,200
Freq resp 200-10,000

Open frame
Bracket mount
0.5 x 0.32 x 0.437"

Microtron
VM 16-M
Transformer, driver
SOAK PERIOD: None

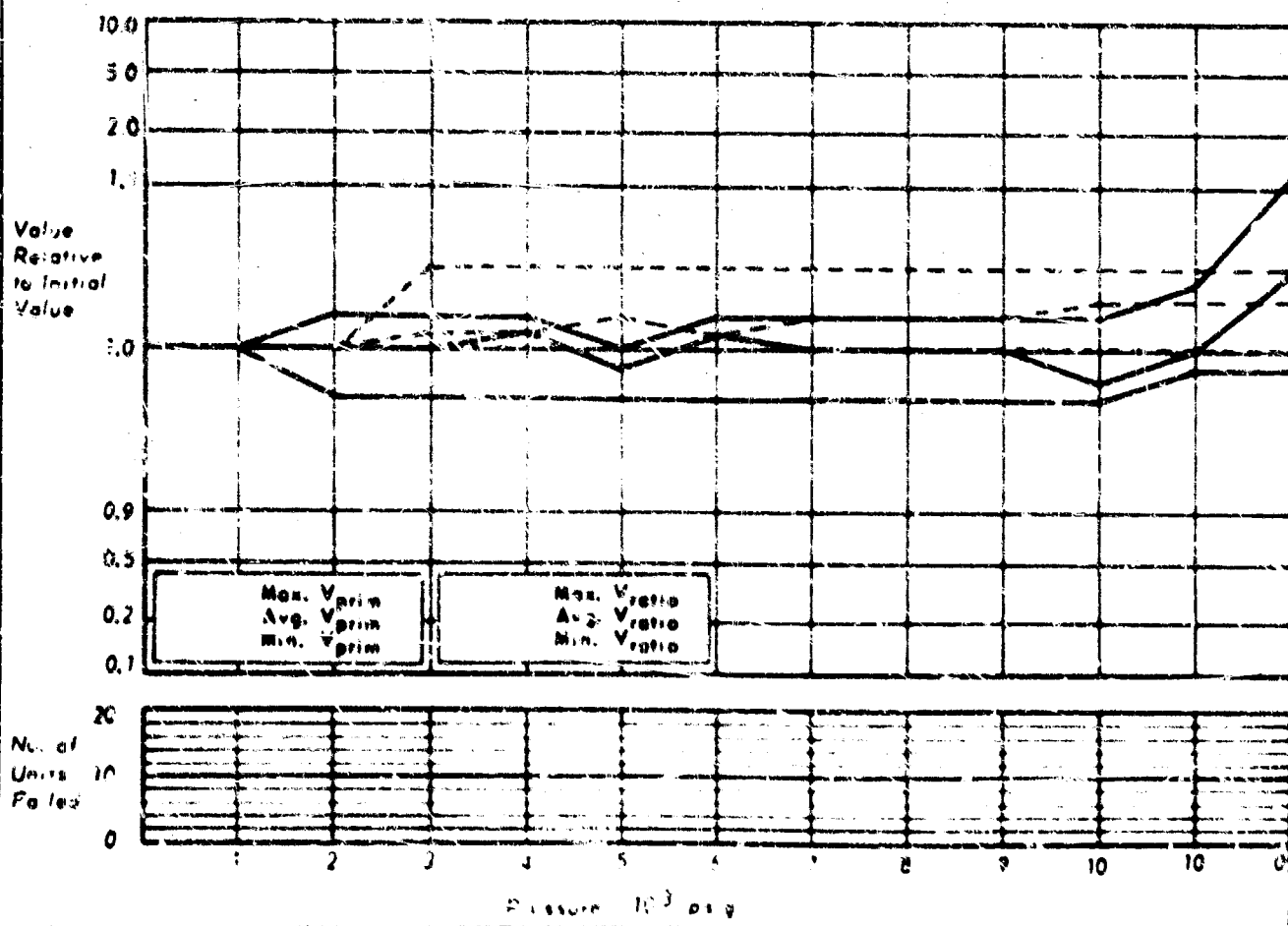
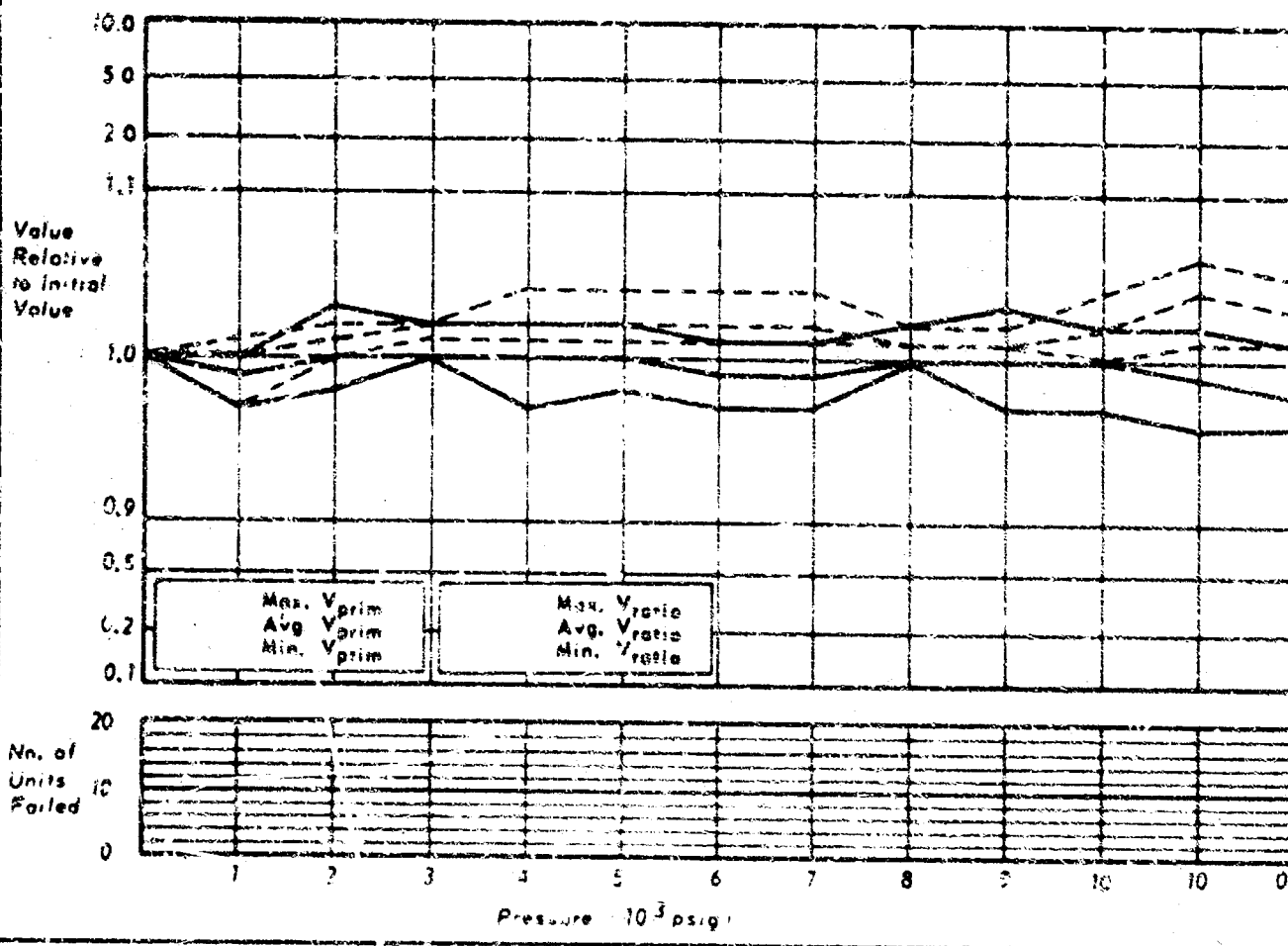
Pri. Imp. 500
Sec. Imp. 250
16W level 15

Epoxy potted
Plug-in type
0.5 x 0.362 x 0.437"

MECHANICAL: No apparent damage.

ELECTRICAL: One component indicated a greater than 30% change with subsequent recovery at pressures shown on graph on opposite page.

FAILURES: Four components indicated a permanent change greater than 30%.



Microtron
VM 31-F
Transformer, interstage
SOAK PERIOD: None
MECHANICAL: No apparent damage.
ELECTRICAL: All components indicated less than 10% change.

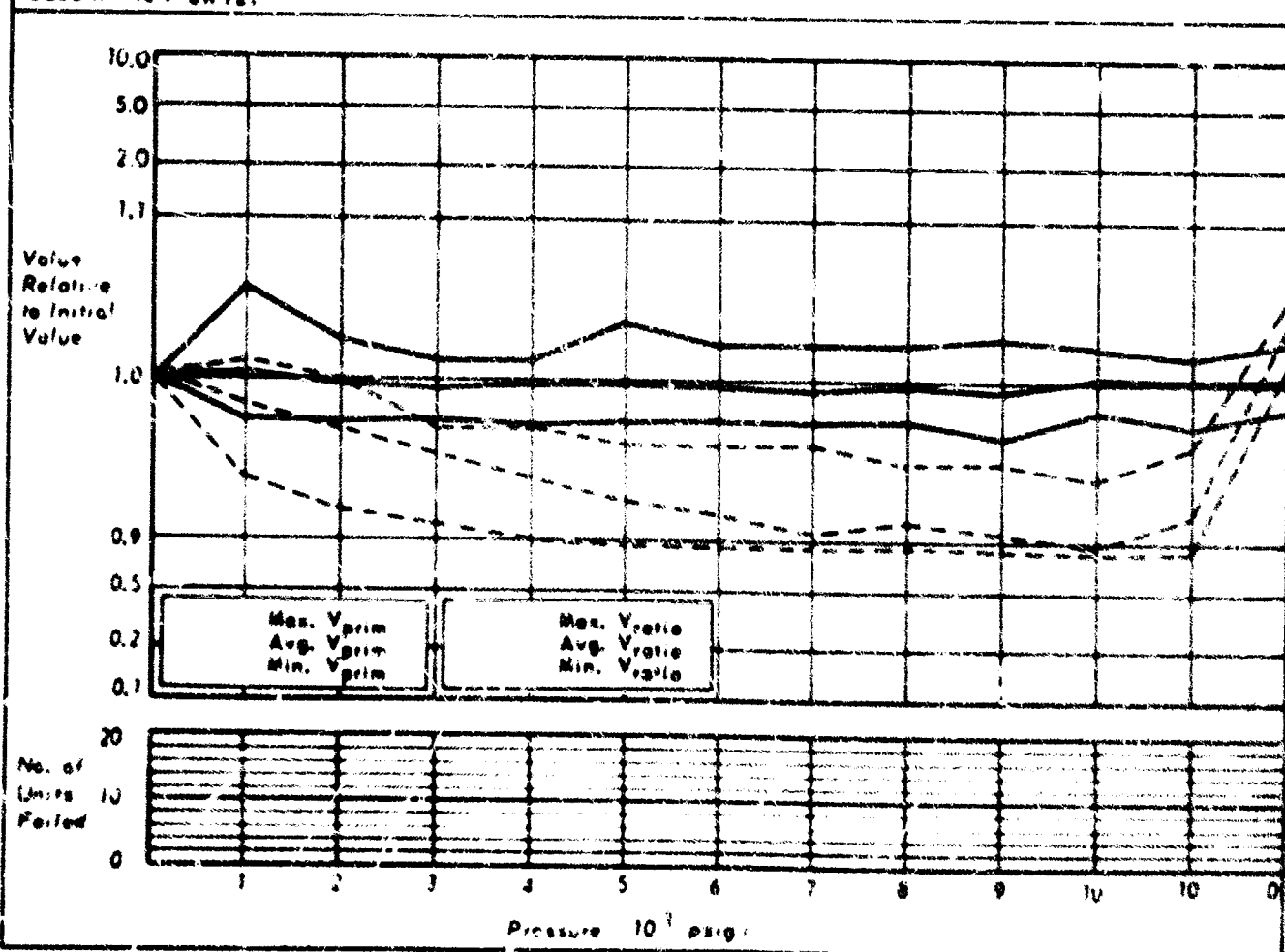
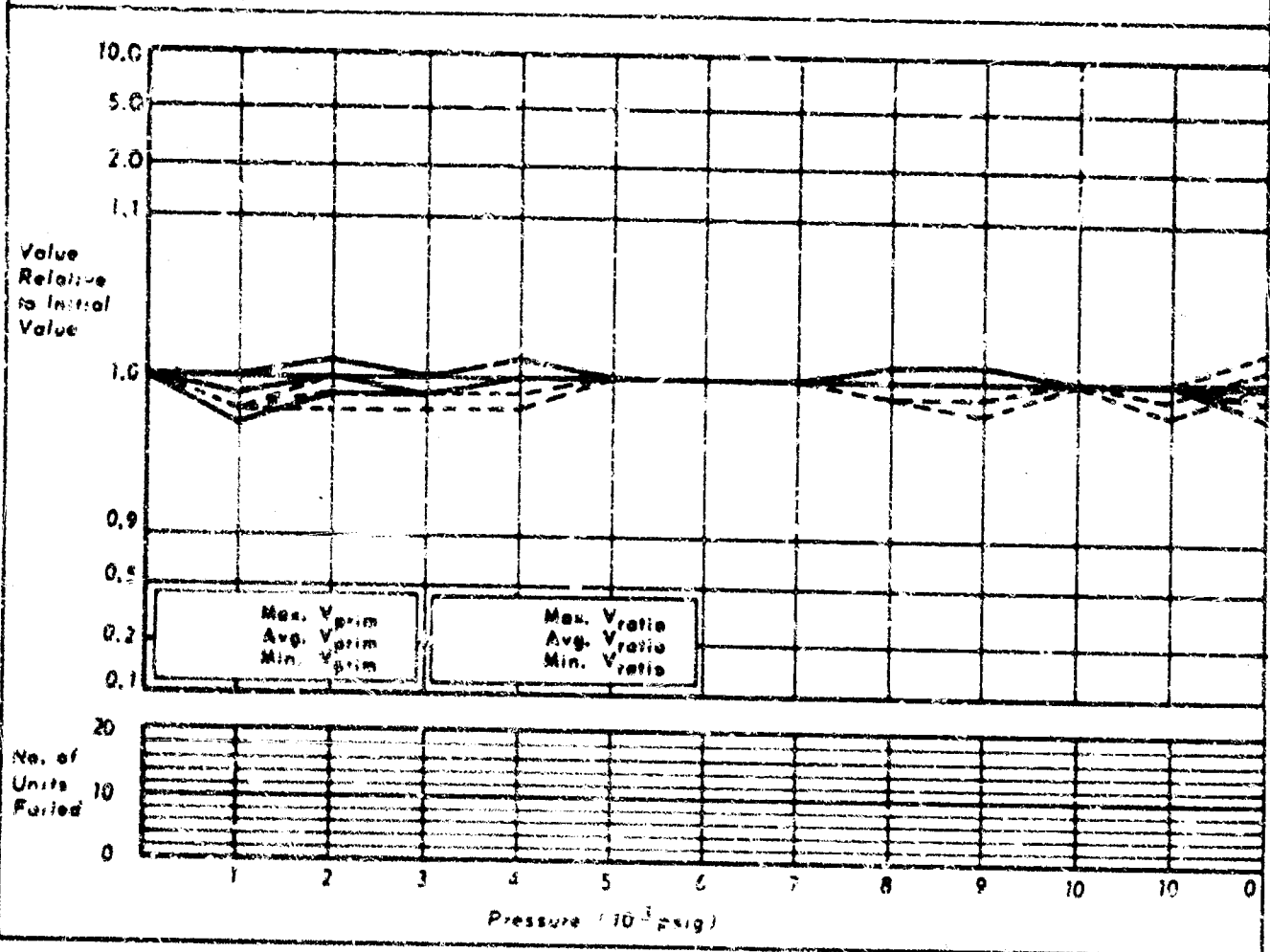
Pri. Imp. 10,000
Sec. Imp. 1,200
MW level 5

Open frame
Bracket mount
0.513 x 0.469 x 0.437"

Microtron
VM 4 FFB
Transformer
SOAK PERIOD: None
MECHANICAL: No apparent damage.
ELECTRICAL: All components indicated less than 10% change.

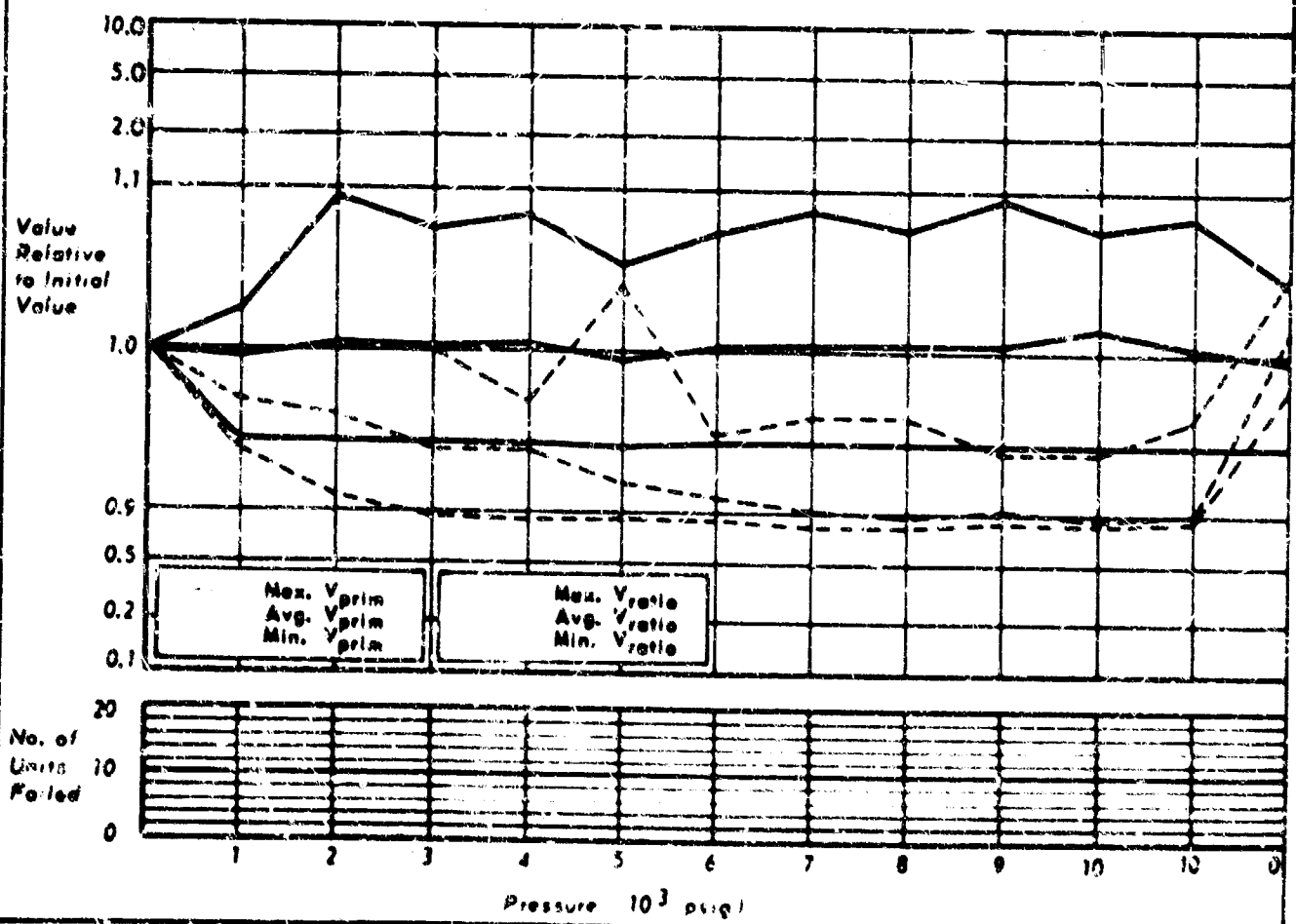
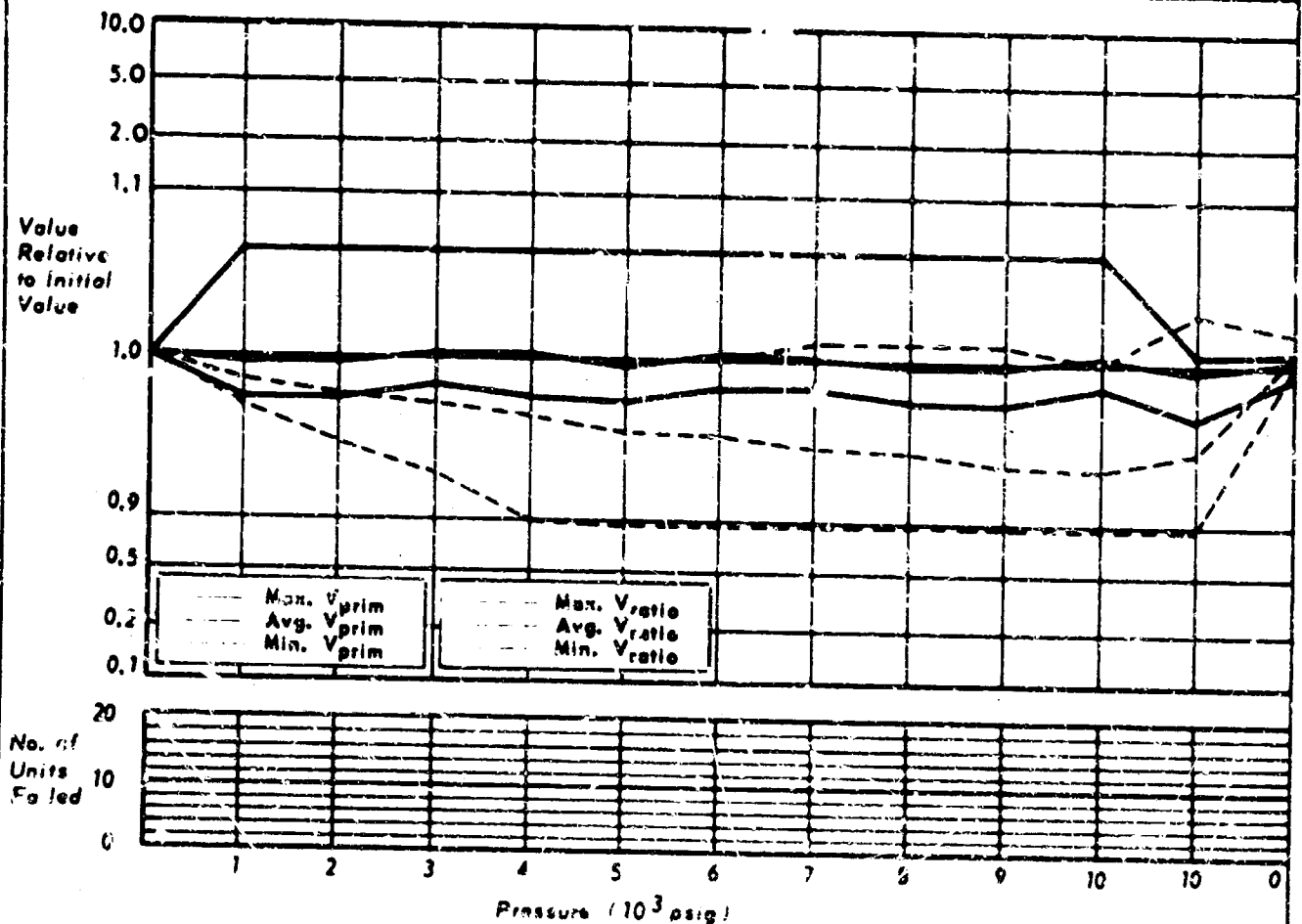
Pri. Imp. 100,000
Sec. Imp. 1,200
MW level 5

Open frame
Bracket mount
0.513 x 0.469 x 0.437"



Microtron	Pri. Imp. 1,500 Ω	Open frame
PM33-F	Sec. Imp. 600 Ω	Bracket mount
Transformer, output	MW level 50	0.315 x 0.244 x 0.24"
SOAK PERIOD: None		
MECHANICAL: No apparent damage.		
ELECTRICAL: All components indicated a change greater than 10% and less than 50%.		

United Transformer	Pri. Imp. 500	Epoxy Improp
GH-727	Sec. Imp. 50	Free flooding
Transformer	MW level 30	0.68 x 0.5 x 0.96"
SOAK PERIOD: None		
MECHANICAL: No apparent damage.		
ELECTRICAL: Fourteen components indicated less than 10% change. Five components indicated more than 10% and less than 50% change.		



United transformer

GH-726

Transformer

Pri. Imp. 500 Ω

Sec. Imp. 50 Ω

MW level 30

Wax impreg.

Free flooding, metal case

0.9 x 0.5 x 0.906"

SOAK PERIOD: 64 hours at 10,000 psig.

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated less than 10% change.

United transformer

GH-729

Transformer

Pri. Imp. 500/125 Ω CT

Sec. Imp. 150/37.5 Ω CT

MW level 1 W at 200 cps

Epoxy impreg.

Free flooding, metal case

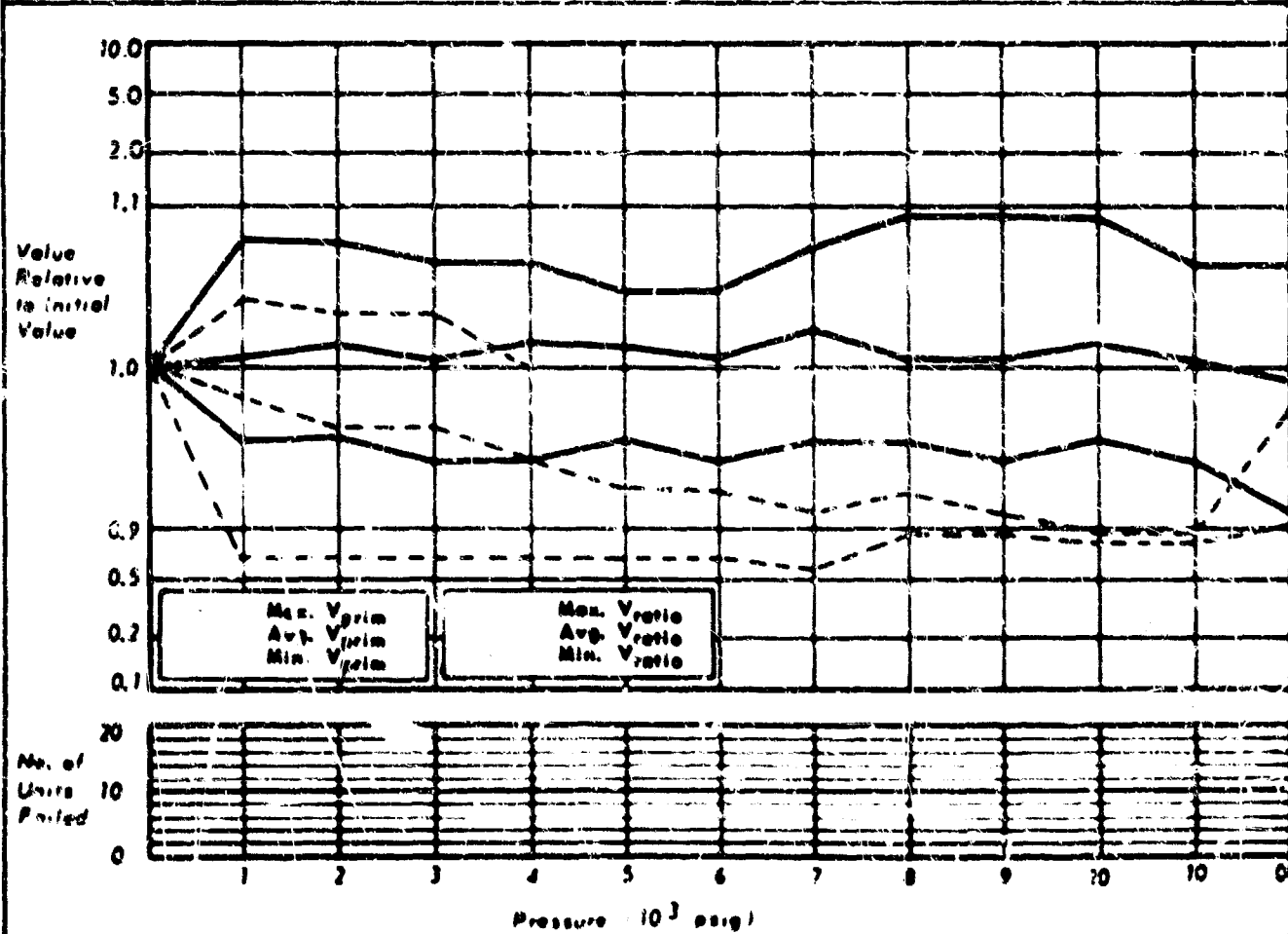
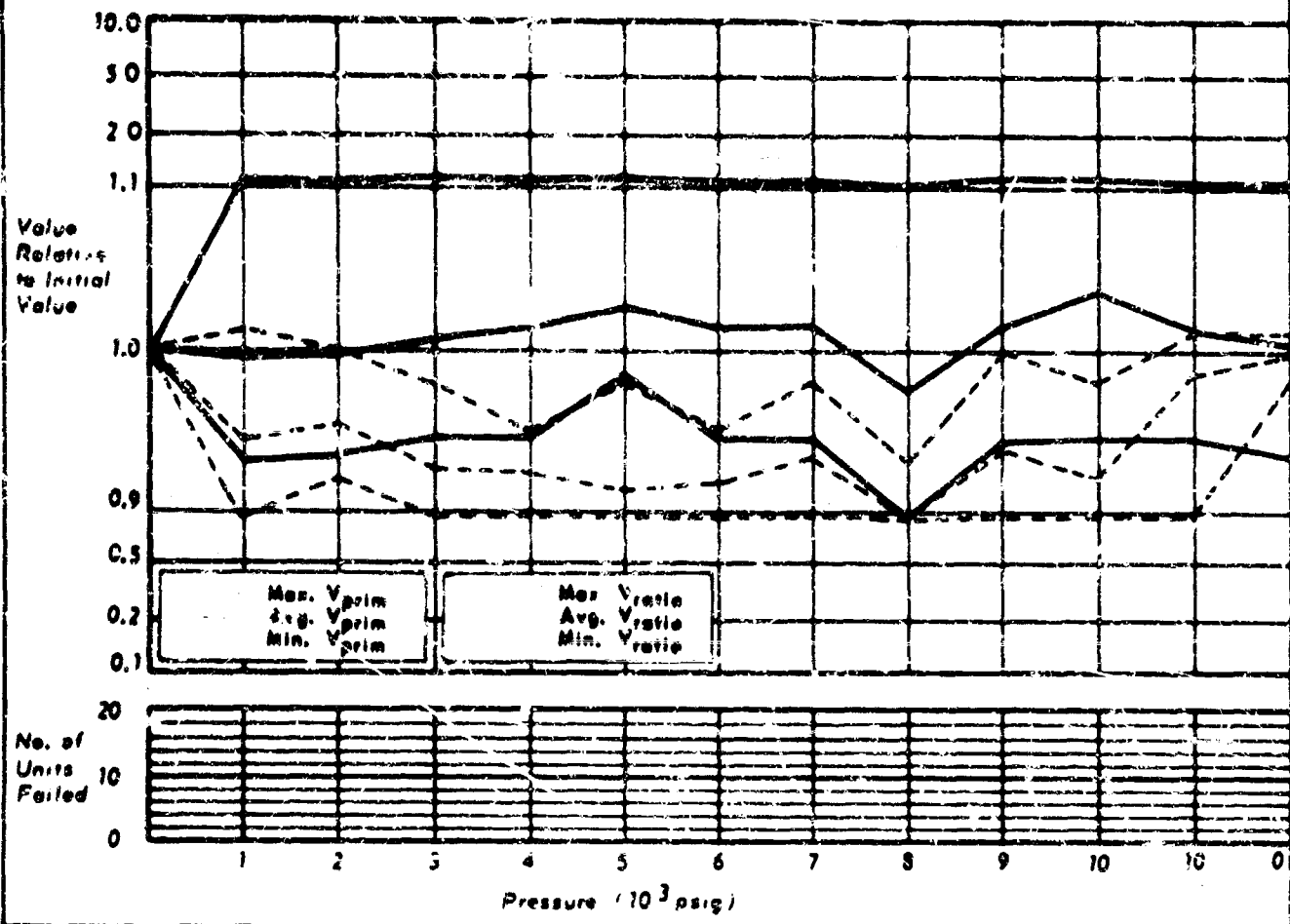
1.4 x 0.95 x 0.218"

SOAK PERIOD: None

MECHANICAL: No apparent damage.

ELECTRICAL: Sixteen components indicated less than 10% change.

Four components indicated a change greater than 10% and less than 50%.

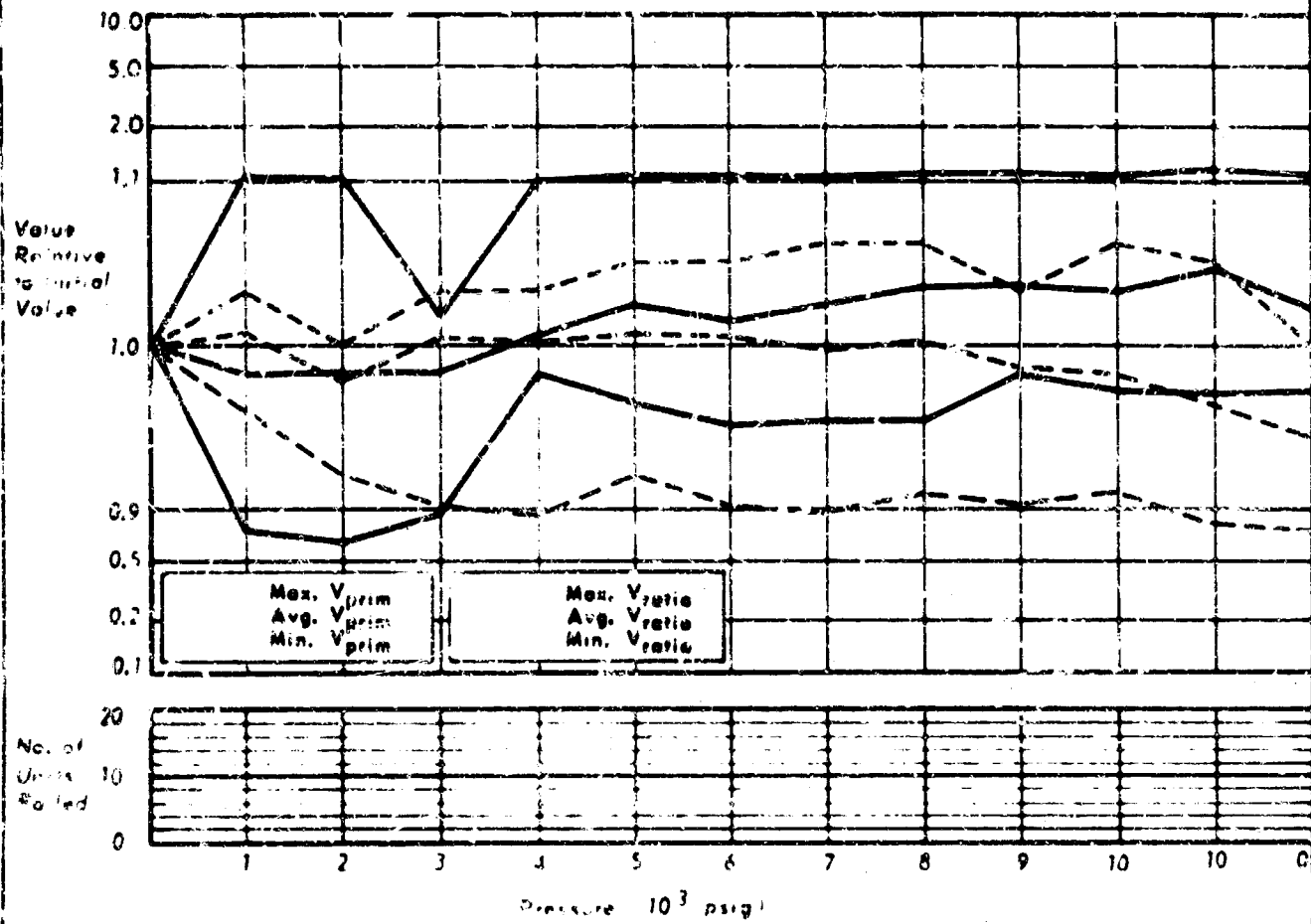


United transformer	500/135 Ω CT	Varnish in preg.
GH-728	150/37.5 Ω CT	Free flanging, metal case
Transformer	MW level 1 W at 200 cps	0.95 x 1.64 x 0.218"
SOAK PERIOD: None		
MECHANICAL: No apparent damage.		
ELECTRICAL: Nineteen components indicated less than 10% change.		
One component indicated a change greater than 10% and less than 50%.		

United Transformer	110/100 Ω CT	Epoxy sealed
GG-T29	31.2/4 Ω CT	Metal clad
Transformer	MW level 500	0.4 x 0.31" diam.
SOAK PERIOD: None		
MECHANICAL: No apparent damage.		
ELECTRICAL: Seventeen components indicated less than 10% change. Two components indicated a change greater than 10% and less than 50%.		

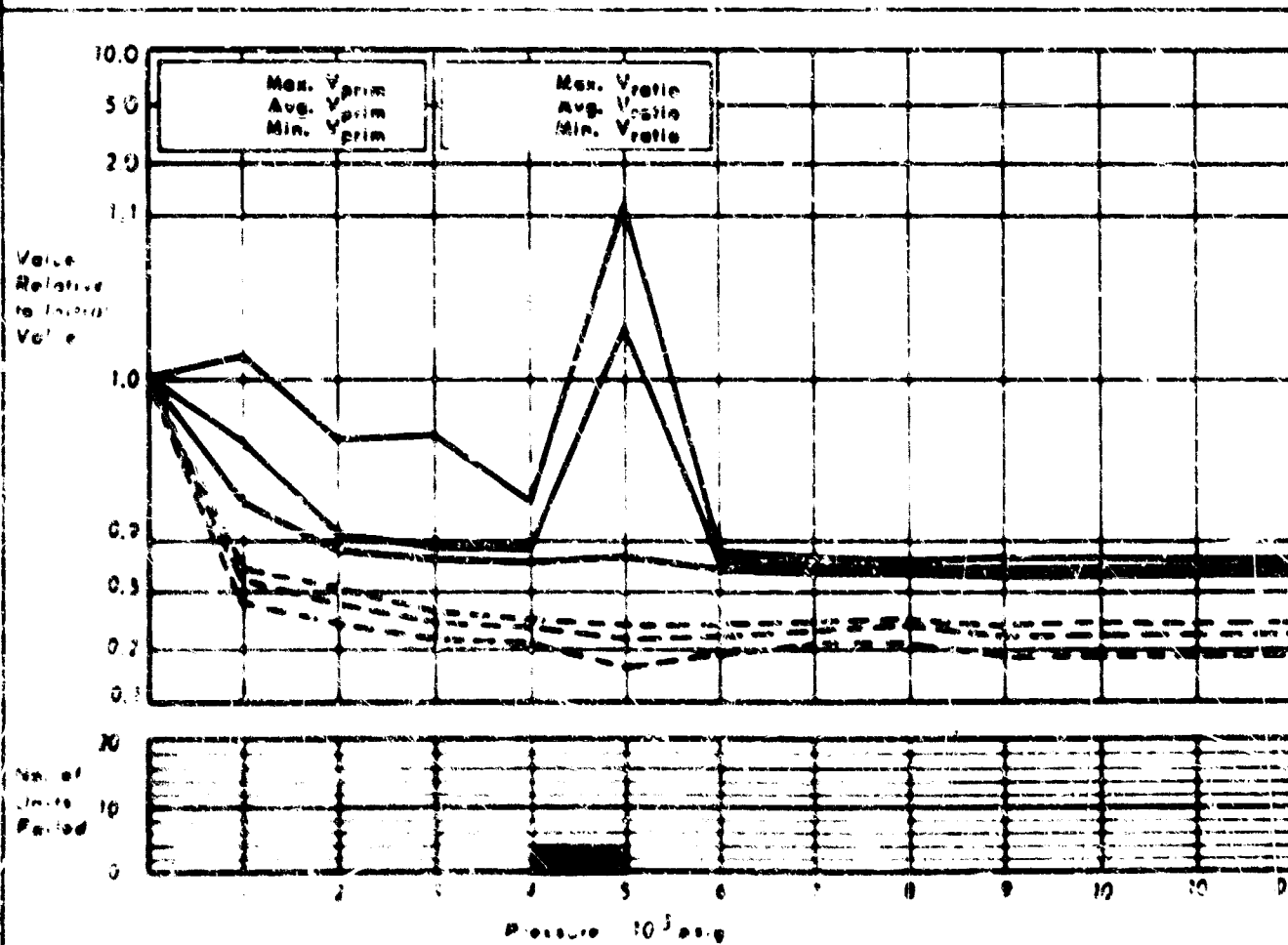
MFG. UNITED TRANSFORMER
 TYPE TRANSFORMER
 DESCRIPTION D-T44

CHART NO. 143
 NO. OF SAMPLES TESTED 12



MFG. UNITED TRANSFORMER
 TYPE TRANSFORMER
 DESCRIPTION D-149

CHART NO. 144
 NO. OF SAMPLES TESTED 20



United transformer

80/100 Ω CT

Epoxy sealed

DT-T44

32/40 Ω split

Metal clad

Transformer

4W level 500

0.43 x 0.312" diam.

SOAK PERIOD: None

MECHANICAL: No apparent damage.

ELECTRICAL: Eleven components indicated less than 10% change.

One component indicated a change greater than 10% and less than 50%.

United transformer

80/100 Ω CT

Molded unit

SO-14P

32/40 Ω split

Vacuum impreg.

Transformer

0.75 x 1.0 x 0.716"

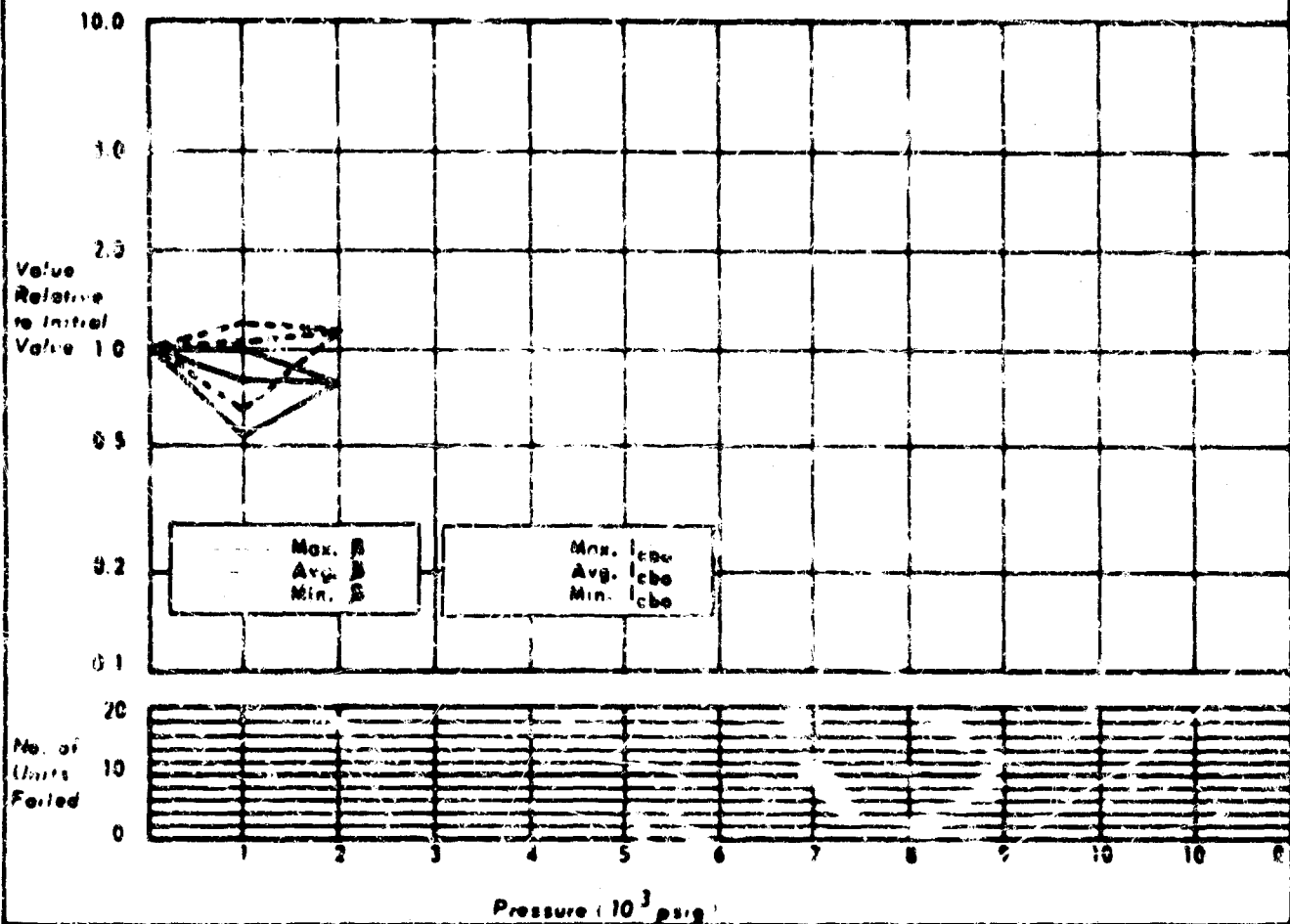
SOAK PERIOD: None

MECHANICAL: No apparent damage.

ELECTRICAL: All components indicated a change greater than 10% and less than 50%.

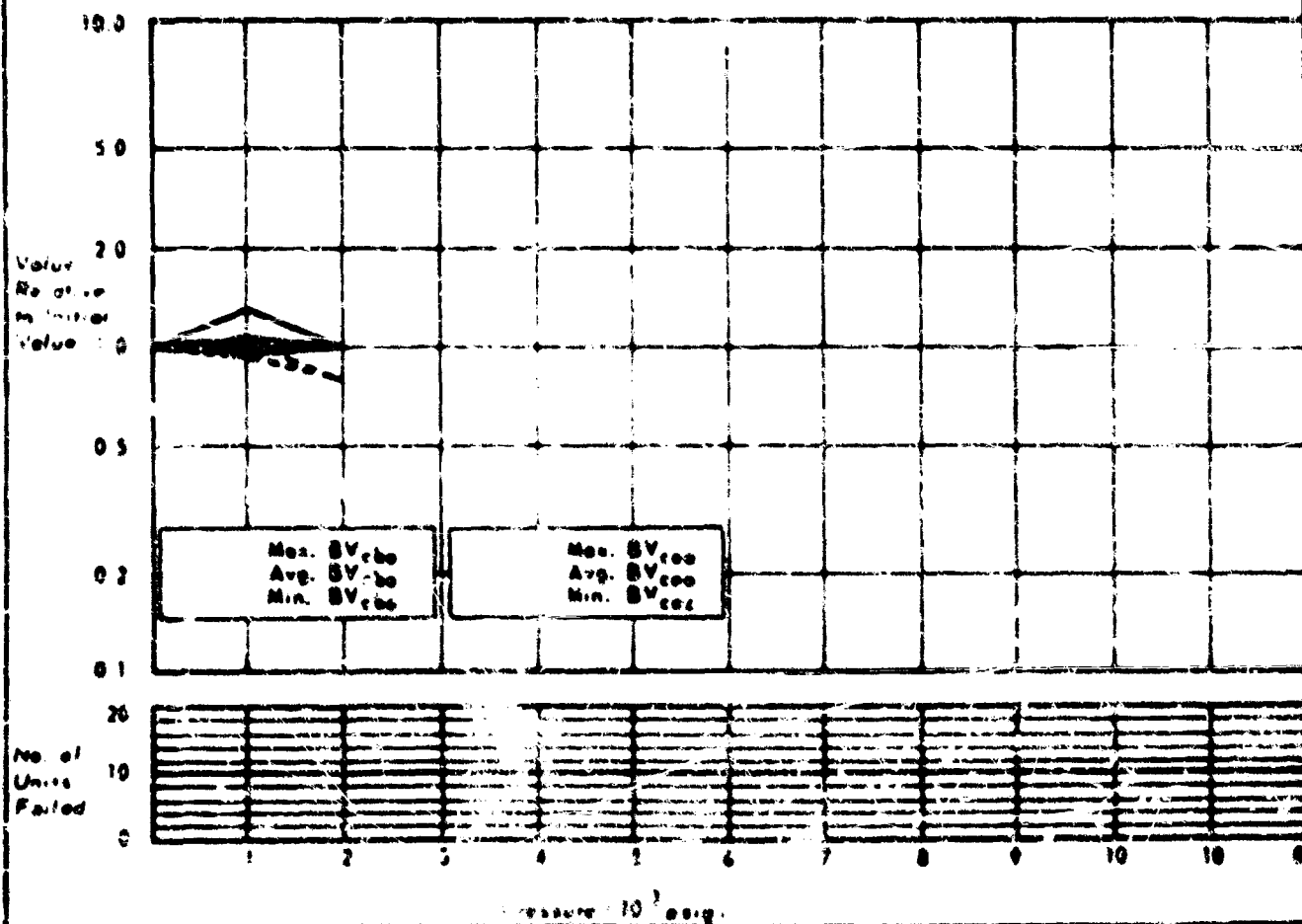
MFG. GENERAL INSTRUMENT
 TYPE TRANSISTOR
 DESCRIPTION 2N599

CHART NO. 145
 NO. OF SAMPLES TESTED 18



MFG.
 TYPE
 DESCRIPTION (SAME AS ABOVE)

CHART NO. 1454
 NO. OF SAMPLES TESTED



General Instruments

2N 399

Translator

$I_{cbo} = 5 \mu A$
 $BV_{cbo} = 45 V$

Germanium, PNP

Atty. function

0.15 x 0.36" diam

SOAK PERIOD: None

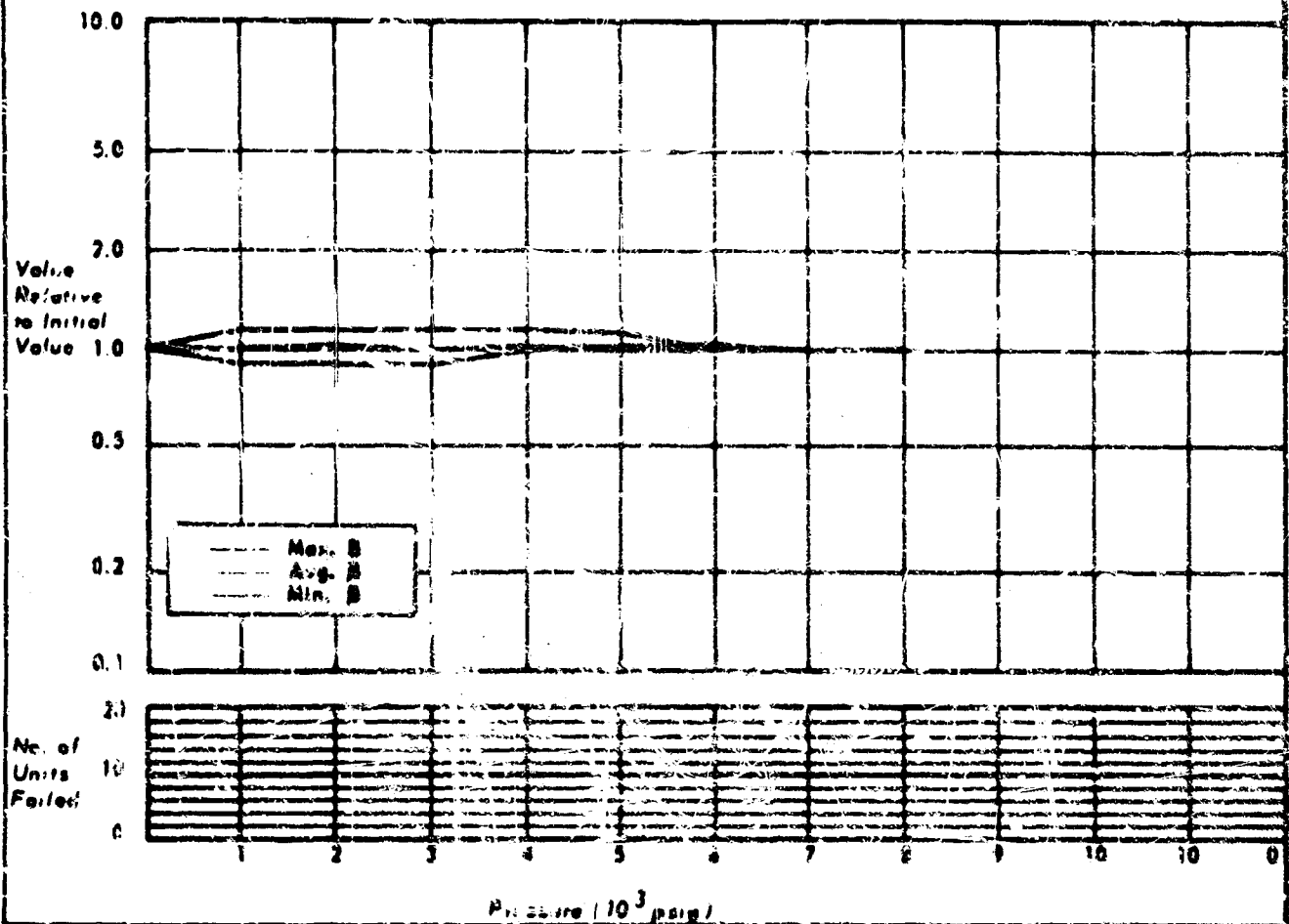
MECHANICAL: The metal cases of all components were deformed.

ELECTRICAL: All components operated with a change of more than 20% and less than 50% through 1,000 psig. One component operated through 2,000 psig. All samples failed above 2,000 psig. Failure in each case was catastrophic.



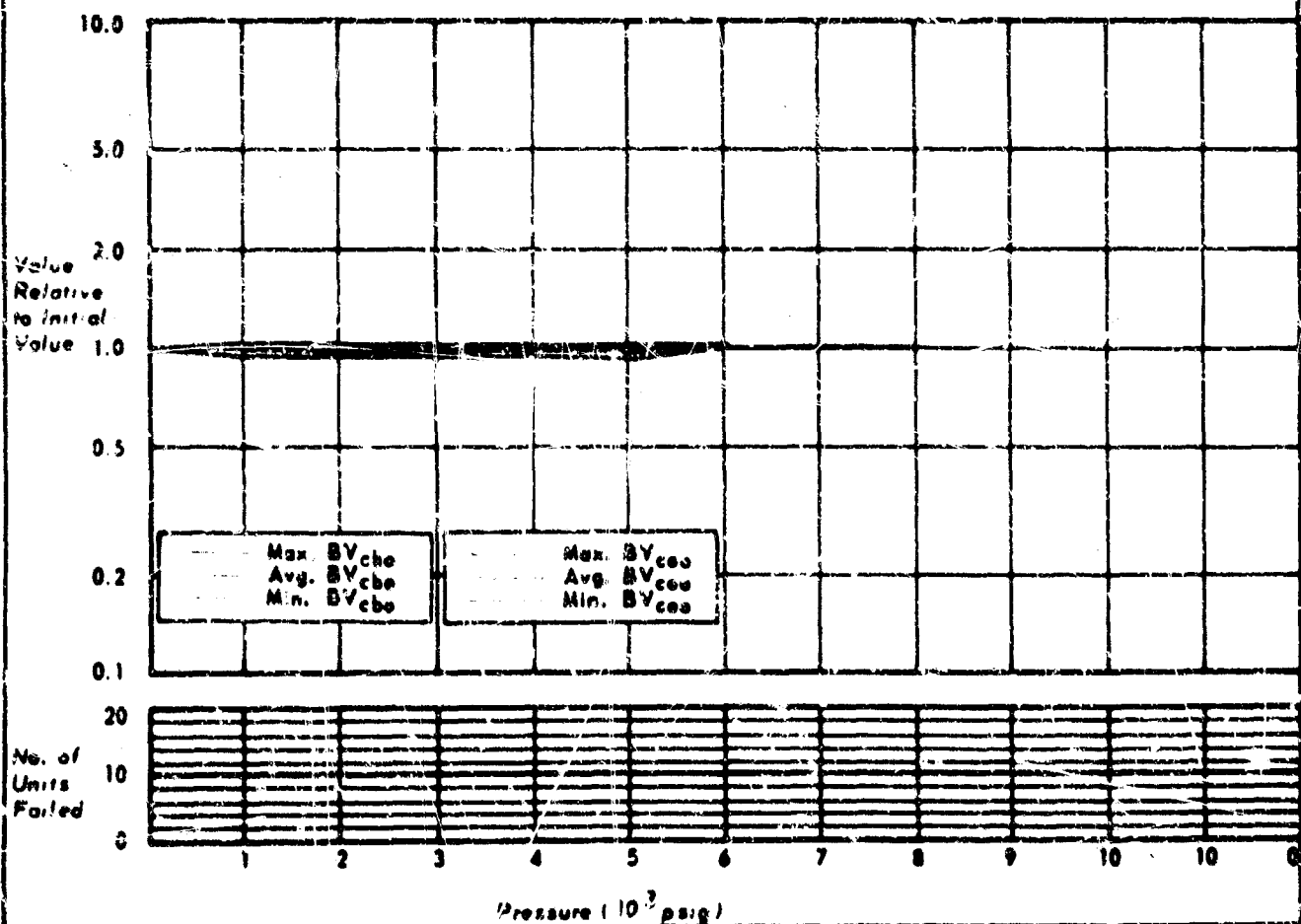
MFG. - GENERAL INSTRUMENTS
 TYPE - TRANSISTOR
 DESCRIPTION - 2N706

CHART NO. 146
 NO. OF SAMPLES TESTED - 19



MFG.
 TYPE
 DESCRIPTION (SAME AS ABOVE)

CHART NO. 146A
 NO. OF SAMPLES TESTED



General Instruments

2N 704

Transistor

$I_{zbo} = 0.01 \mu A$

$BV_{zbo} = 25 V$

Silicon, NPN

Planar, epitaxial

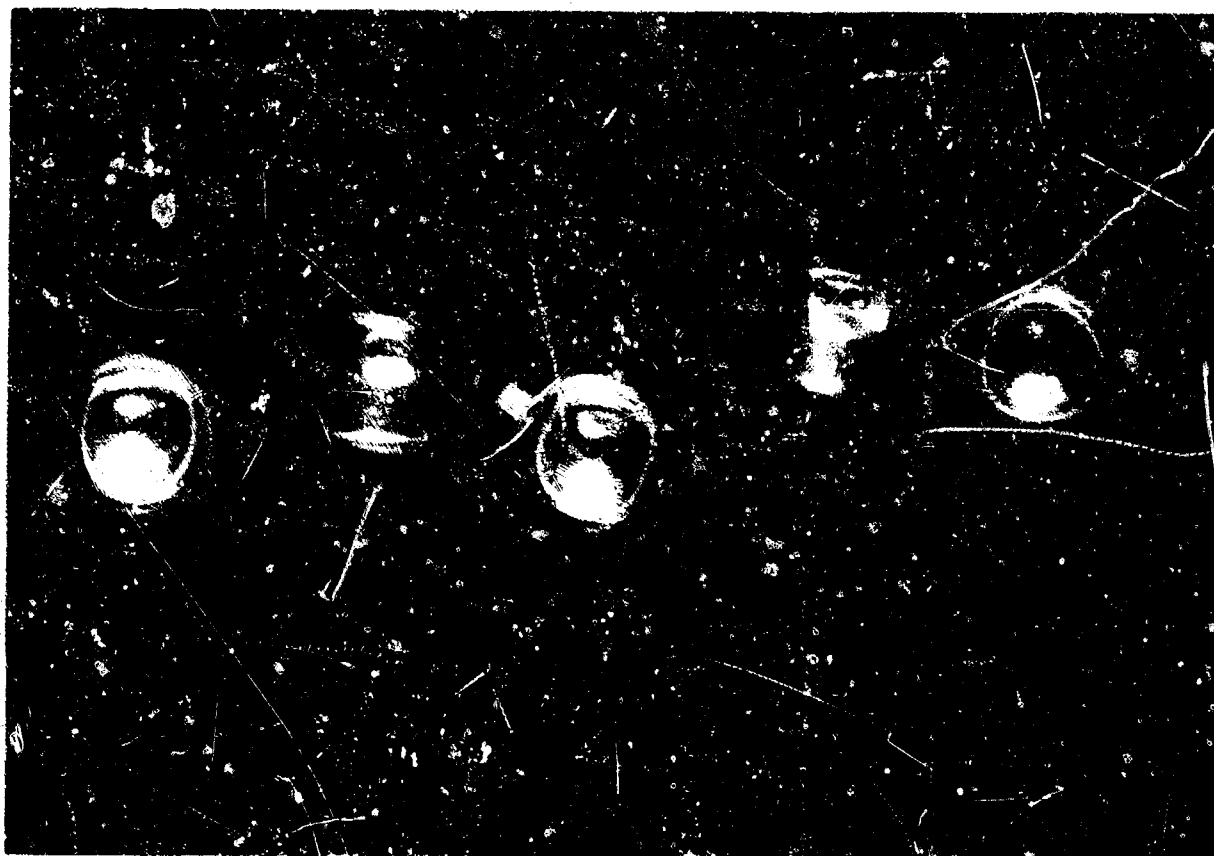
TO case

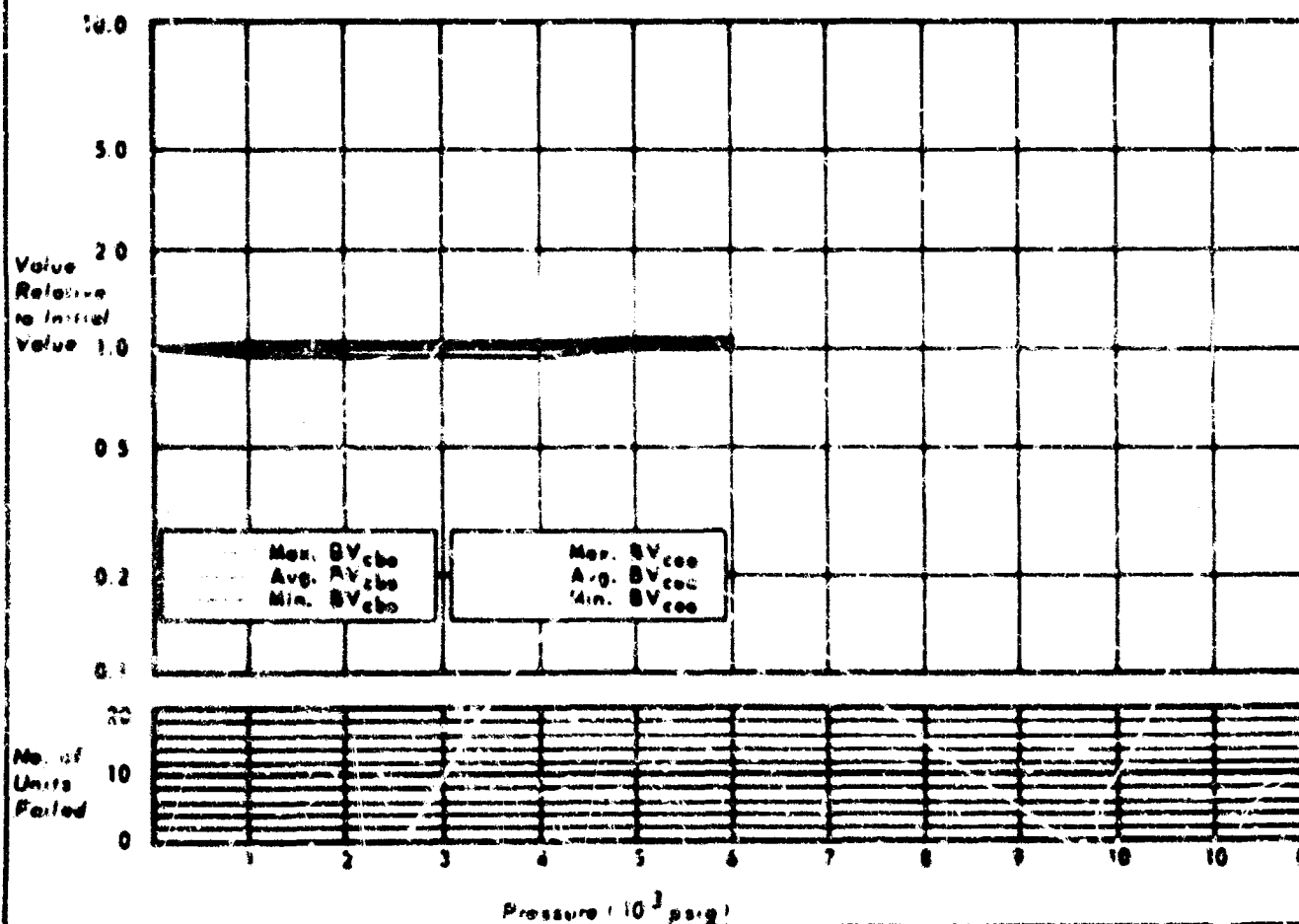
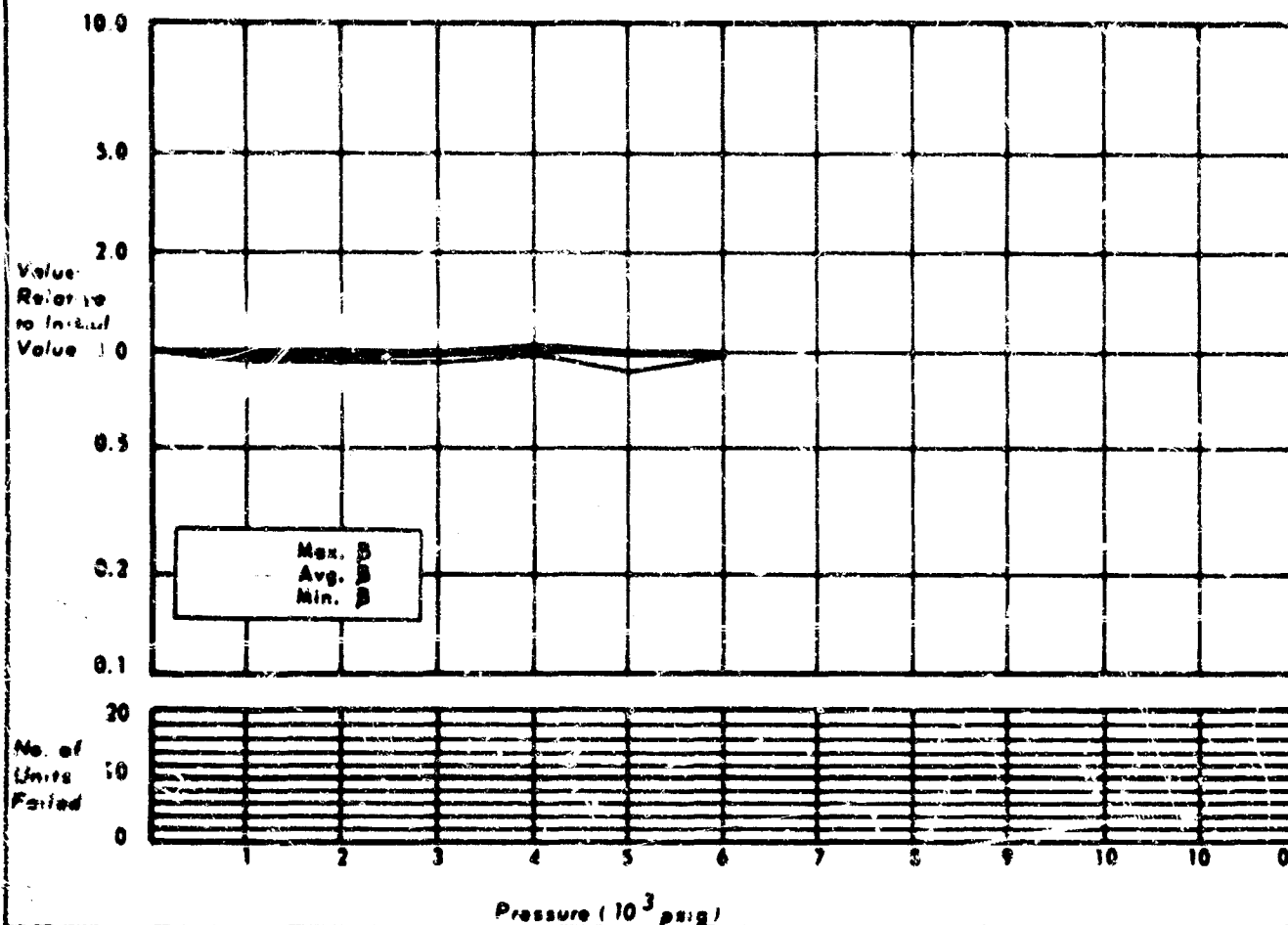
0.20 x 0.21" diam

SOAK PERIOD: None

MECHANICAL: The metal cases of all components were deformed.

ELECTRICAL: All components functioned normally through 4,000 psig, eleven operated through 5,000 psig, eight through 6,000 psig and two through 7,000 psig. All components failed above 7,000 psig. Failure in each case was catastrophic.





Motorola
2N 834
Transistor

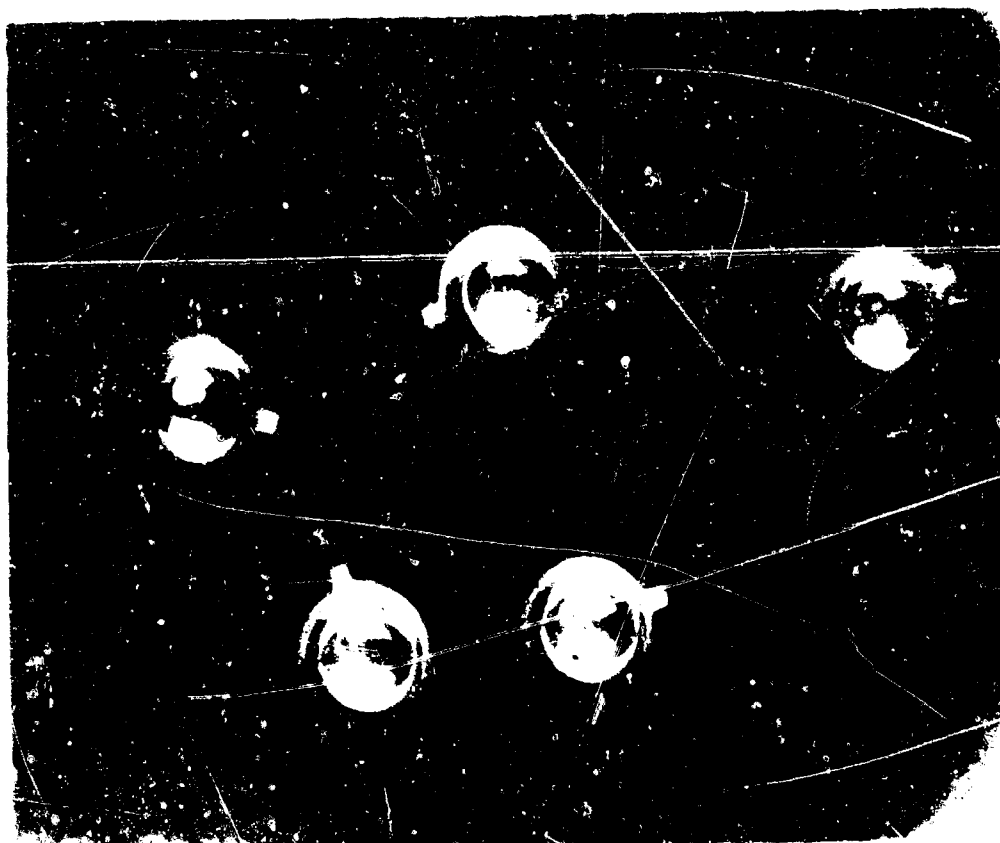
$I_{cbo} = 6 \mu A$
 $BV_{cbo} = 40 V$

Silicon, MPN
Epitaxial mesa

SOAK PERIOD: None

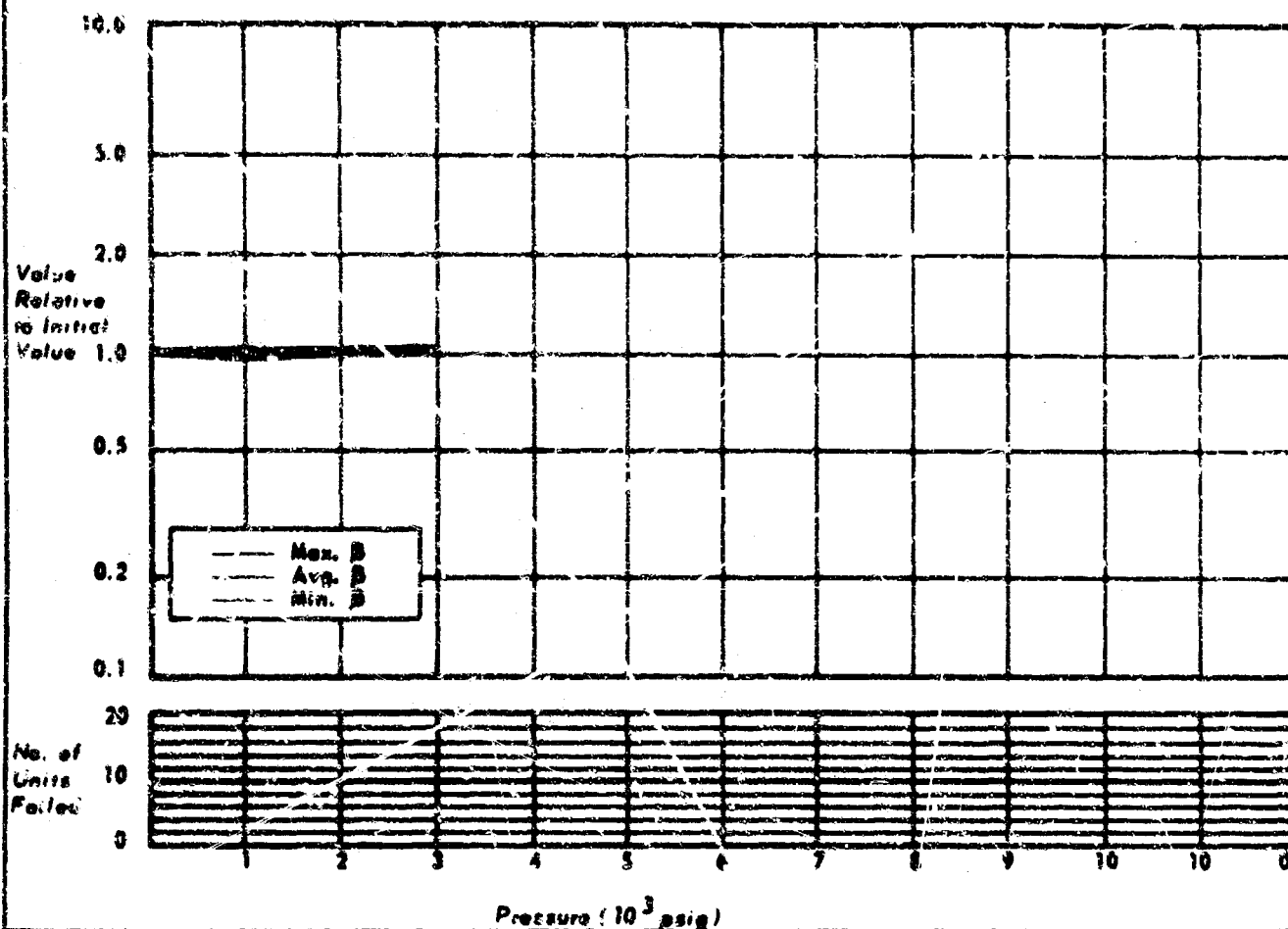
MECHANICAL: All metal cases were deformed.

ELECTRICAL: All components operated with less than 10% change through 4,000 psig, thirteen operated through 5,000 psig and six operated with less than 25% change through 6,000 psig. All failures were catastrophic.



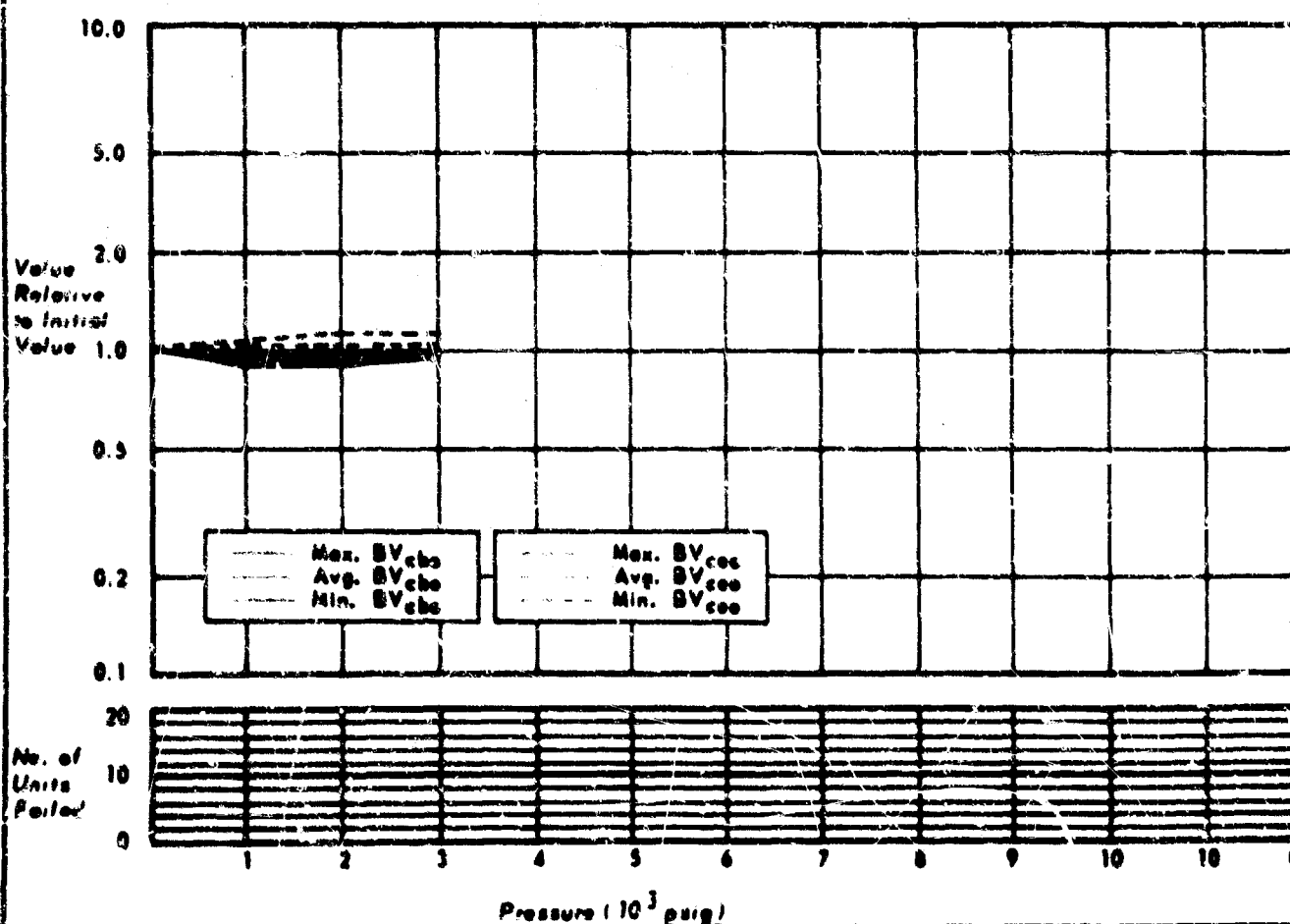
MFG. - MOTOROLA
 TYPE - TRANSISTOR
 DESCRIPTION - 2N2218

CHART NO. 148
 NO. OF SAMPLES TESTED - 19



MFG.
 TYPE
 DESCRIPTION

CHART NO. 148A
 NO. OF SAMPLES TESTED



Motorola
2N 2218
Transistor

$I_{cbo} = .01 \mu A$
 $BV_{cbo} = 40 V$

Silicon, NPN
Annular epitaxial

SOAK PERIOD: None

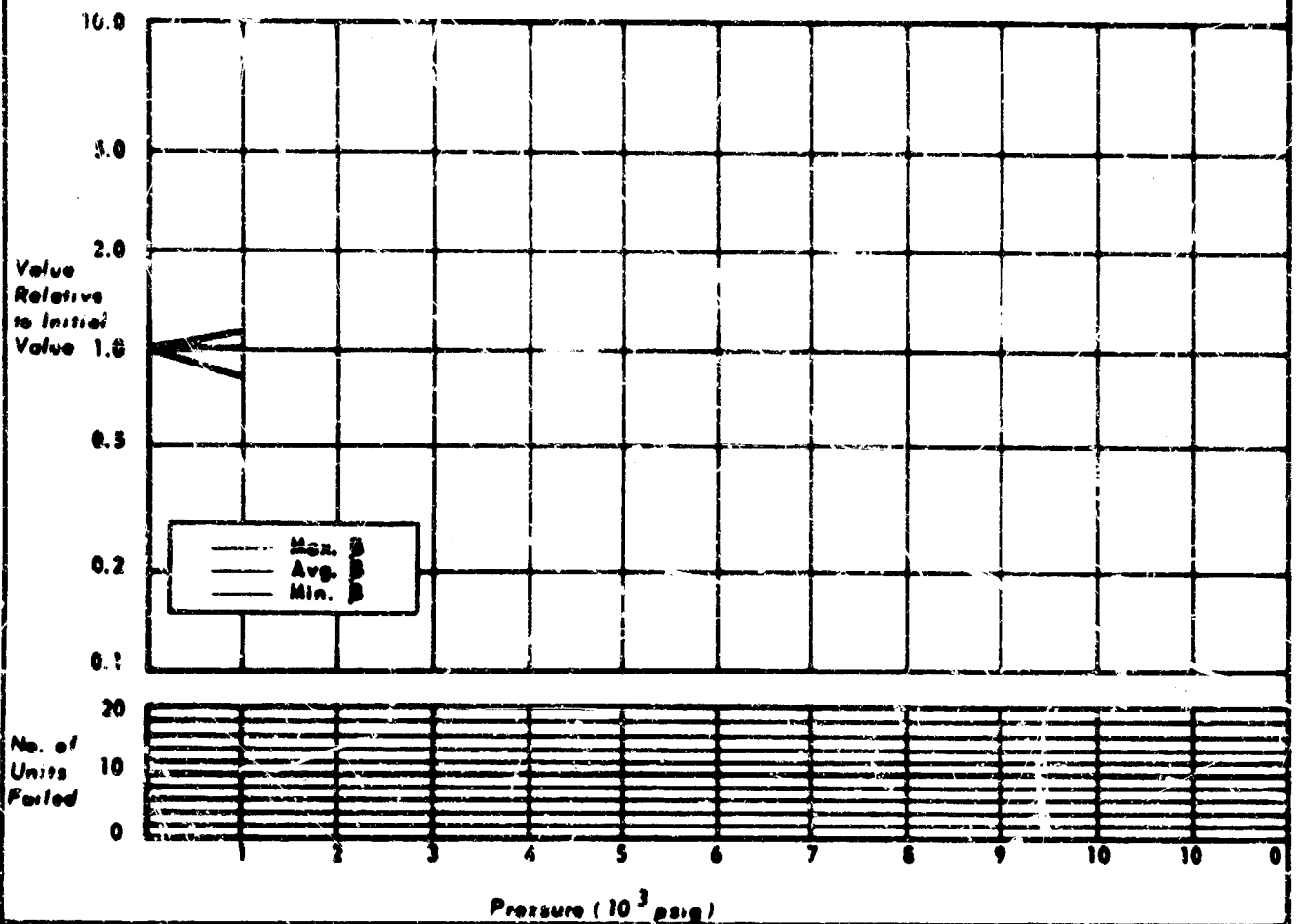
MECHANICAL: All metal cases were deformed.

ELECTRICAL: All components operated with less than 10% change through 2,000 psig and nine with less than 10% change through 3,000 psig. All failures were catastrophic.



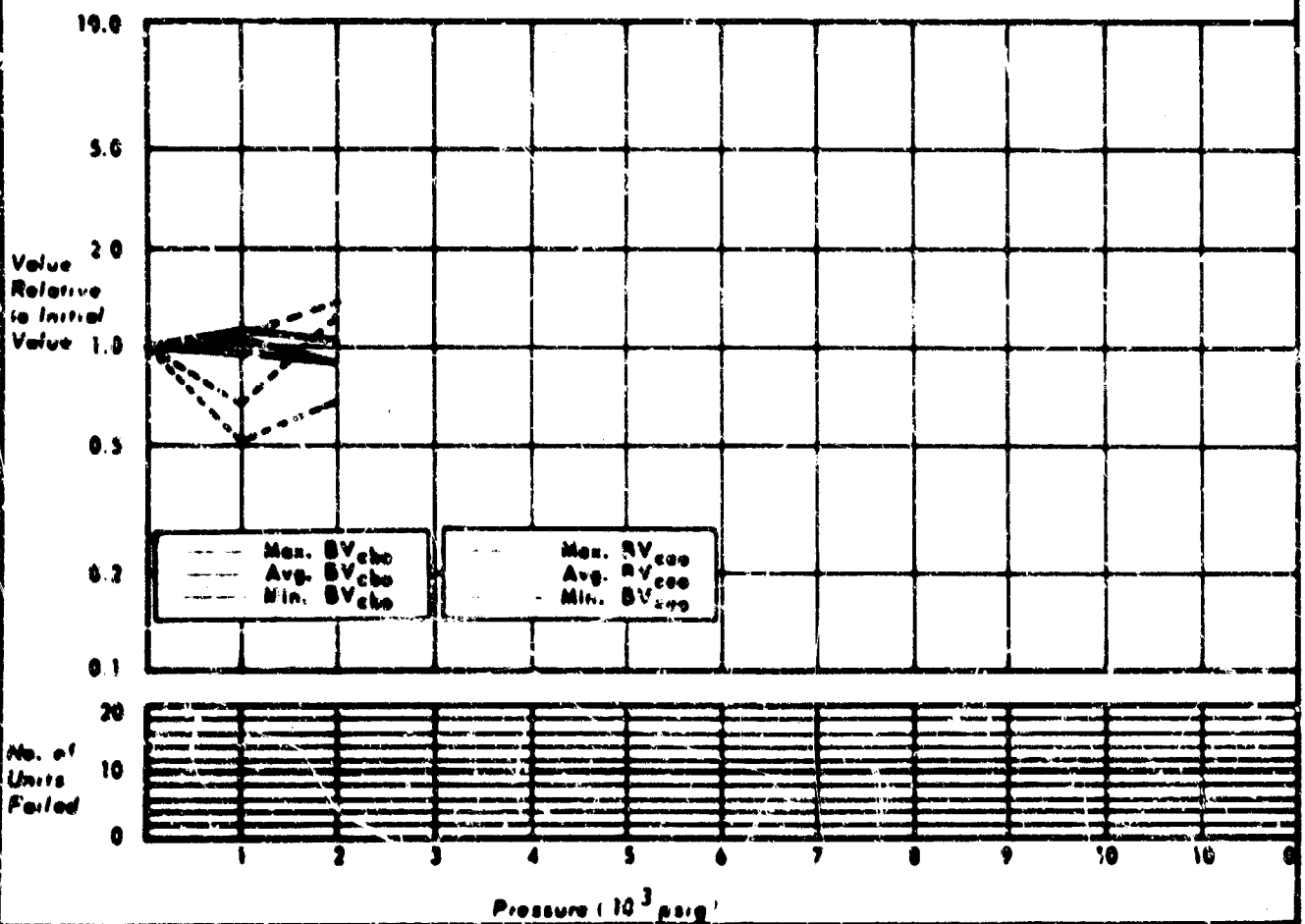
MFG. Sylvania
 TYPE TRANSISTOR
 DESCRIPTION 2N706B

CHART NO. 149
 NO. OF SAMPLES TESTED 20



MFG. TYPE
 DESCRIPTION (SAME AS ABOVE)

CHART NO. 149A
 NO. OF SAMPLES TESTED



Sylvania
2N 7043
Transistor

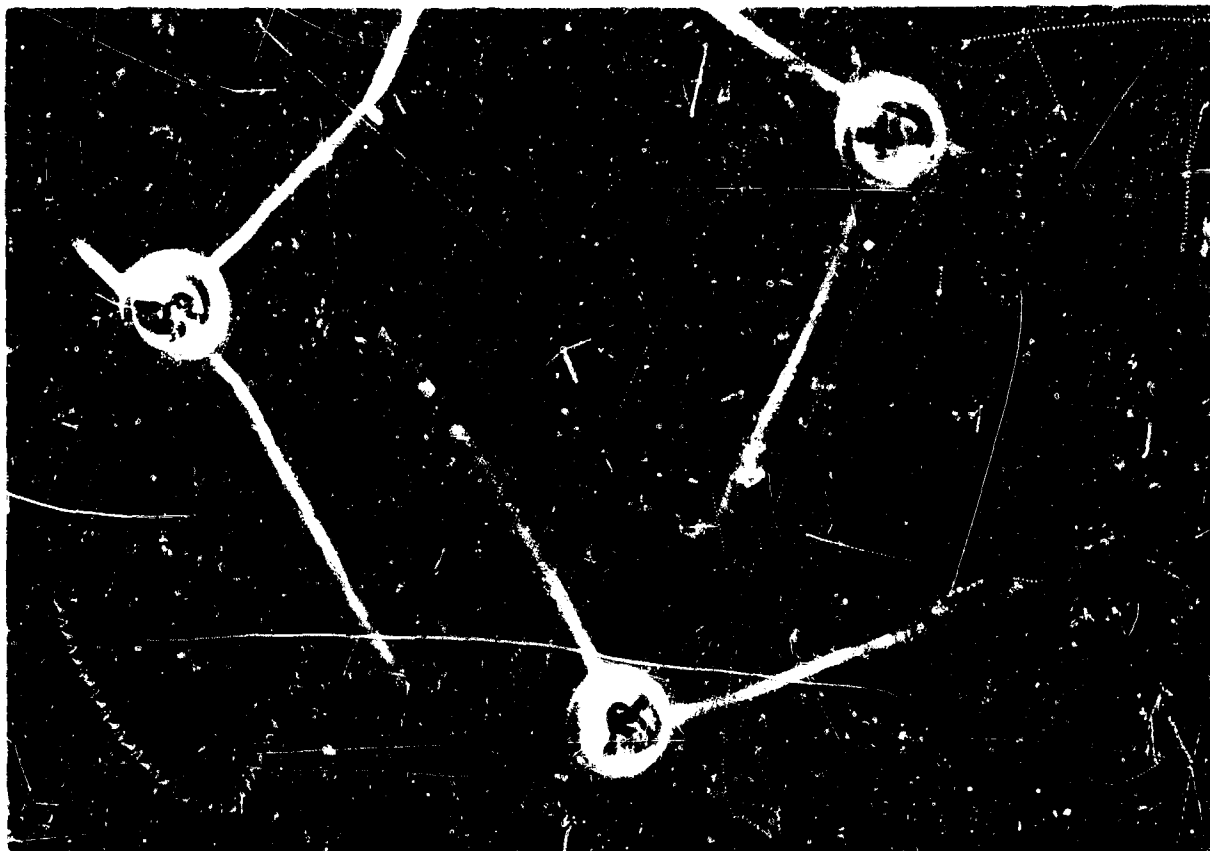
$I_C = 200 \text{ mA}$
 $V_{CE} = 25 \text{ V}$

NPN Silicon
Epitaxial planar
Diffused, passivated
 $0.205 \times 0.21''$ diam.

SOAK PERIOD: None

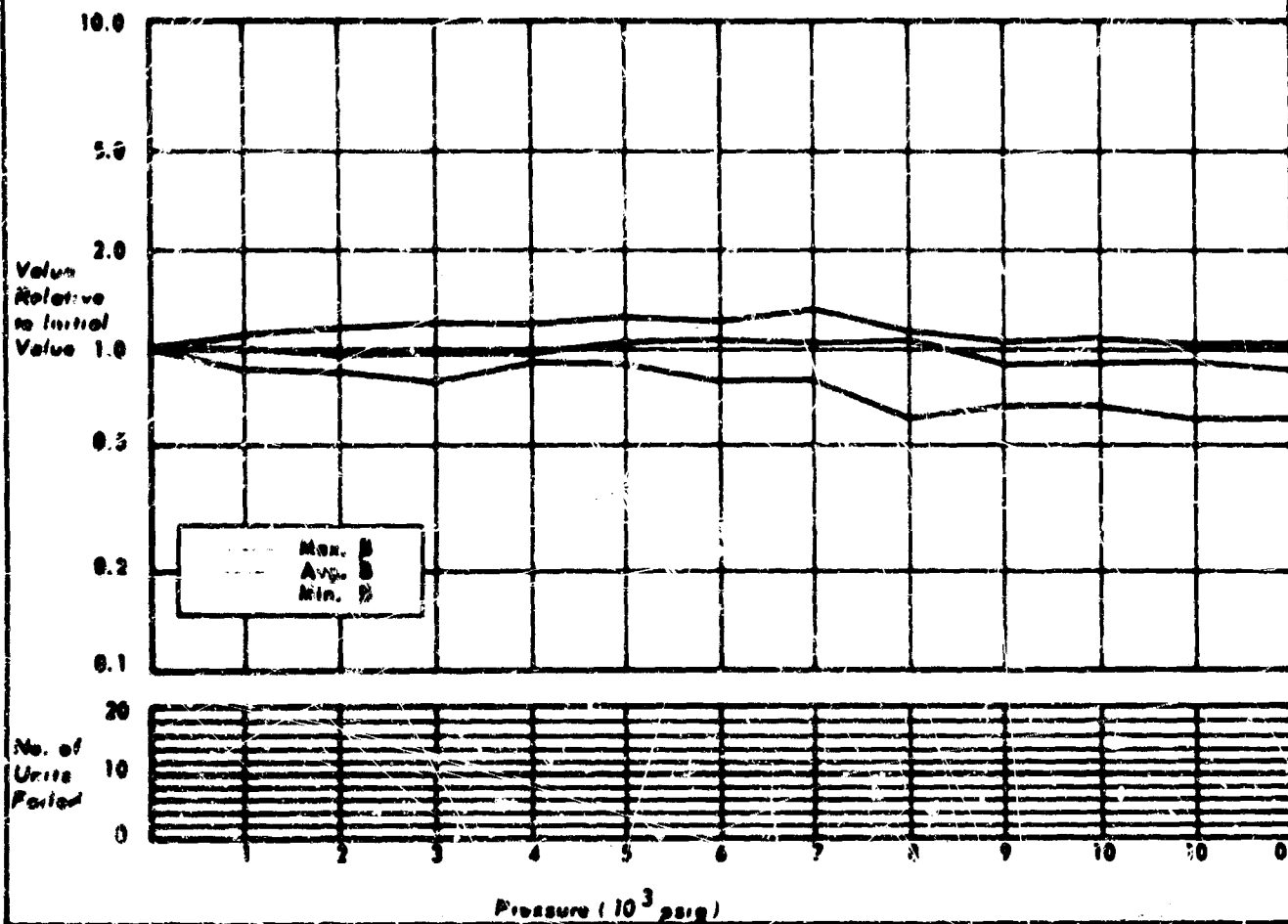
MECHANICAL: All metal cases were deformed.

ELECTRICAL: All components functioned normally through 2000 psig. Two components failed completely above 2000 psig and the remaining eighteen indicated incipient failure. All components failed above 3000 psig.



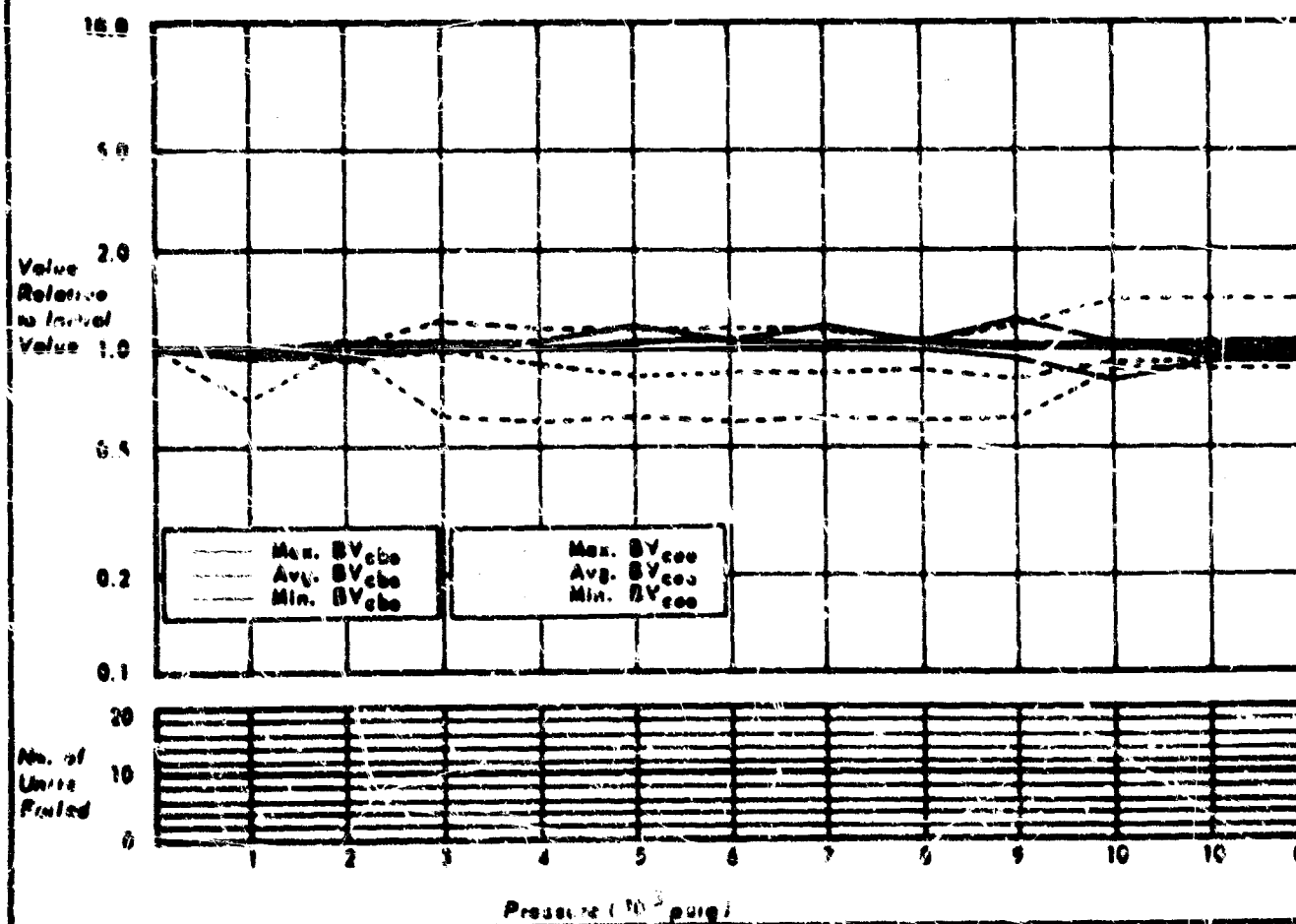
MFG. - Sylvania
 TYPE - TRANSISTOR
 DESCRIPTION - 2N4121

CHART NO. 150
 NO. OF SAMPLES TESTED - 8



MFG.
 TYPE
 DESCRIPTION (SAME AS ABOVE)

CHART NO. 150A
 NO. OF SAMPLES TESTED



Sylvania
2N 4131
Transistor

$I_{cbo} = 1 \mu A$
 $BV_{cbo} = 20 V$

Silicon, NPN
Planar epitaxial
Epoxy encaps

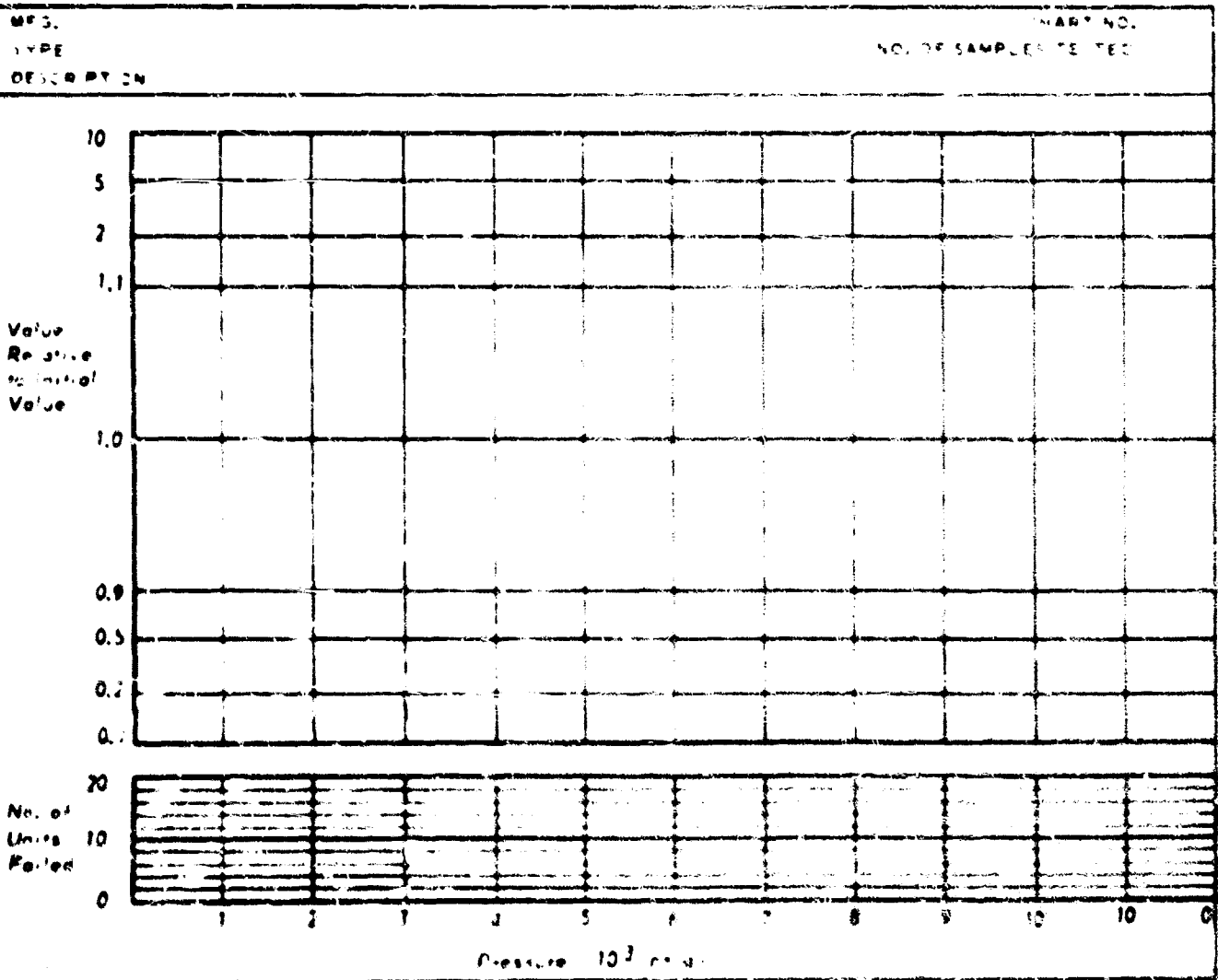
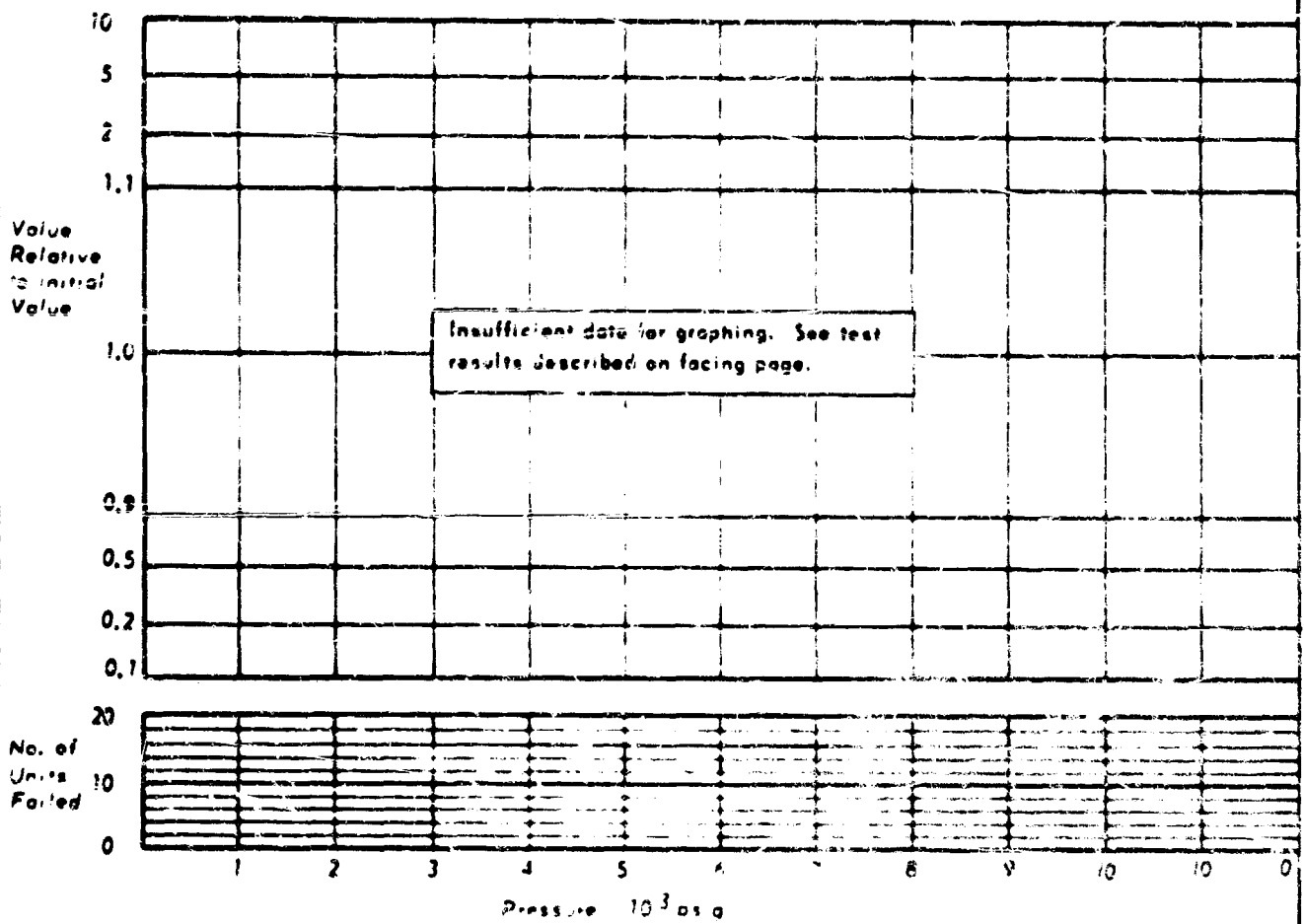
SOAK PERIOD: None

MECHANICAL: All metal cases were deformed.

ELECTRICAL: Six components functioned satisfactorily through the entire test program.
Two components failed above 7,000 psig.

MFG. - SYLVANIA
 TYPE - TRANSISTOR
 DESCRIPTION - SYL4542

CHART NO. 131
 NO. OF SAMPLES TESTED



Sylvania
SYL4542
Transistor

$I_{cbo} = 5 \mu A$
 $hV_{cbo} = 15 V$

Silicon, epitaxial planar
Diffused, passivated
Kover top mounting
 $0.04 \times 0.02 \times 0.003''$

SOAK PERIOD: 16 hours at 10,000 psig.

Due to the extremely small size of the components, functional operation was impossible during test. The laboratory facilities available were also considered inadequate for evaluation following test. The components were therefore subjected to the entire test program and subsequently returned to the vendor for operational check. The following information was received from Sylvania.

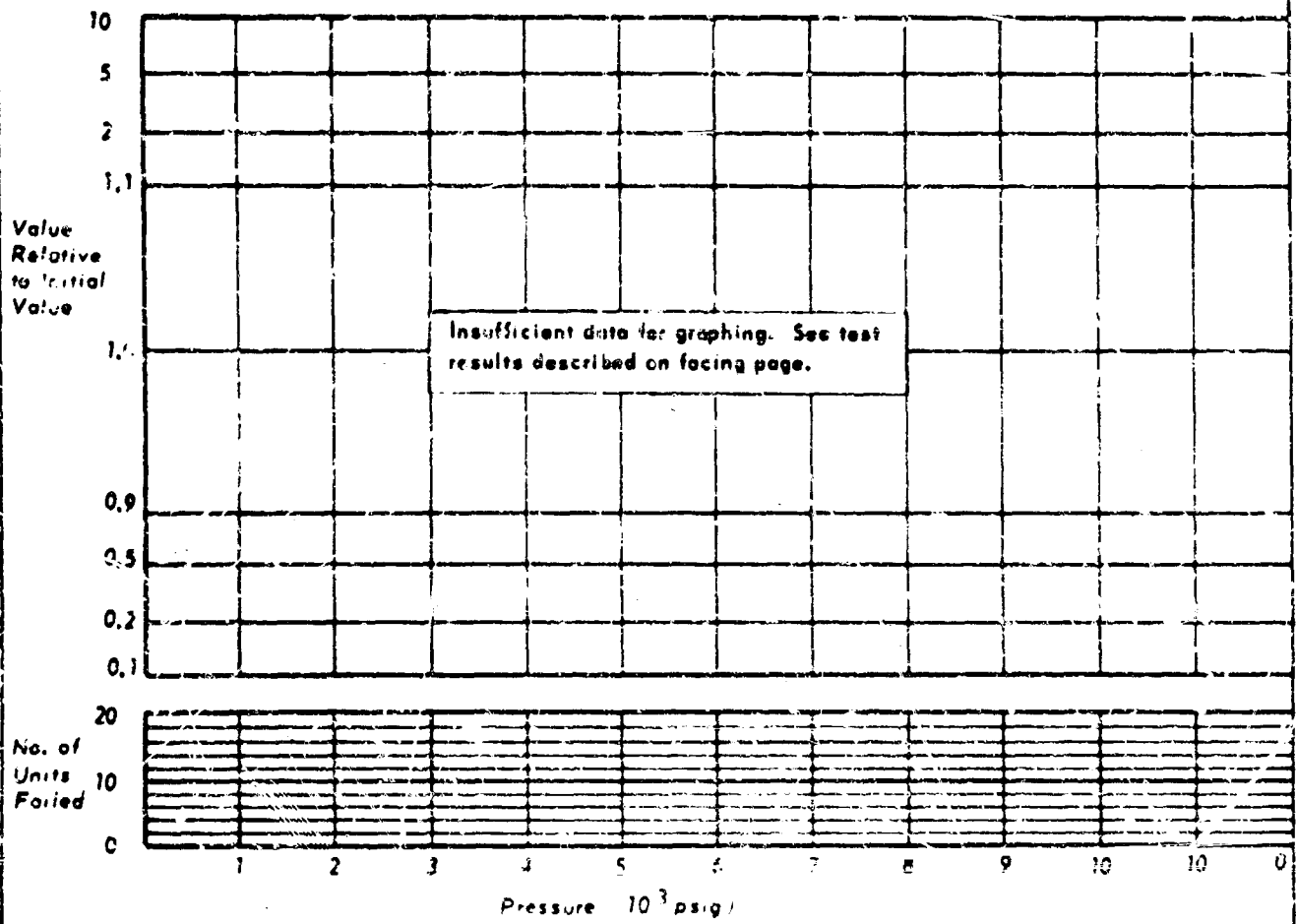
All units were examined microscopically. It was found that the aluminum metallization of all units displayed a black corrosion, which made electrical contact to some of the units impossible. However, electrical contact was successfully made to the large majority of the units without removal of the corrosion. The following electrical characteristics were measured by probing:

		Min.	Med.	Max.	Units
hV_{cbo}	@ $10 \mu A$	25	27.5	30	volts
hV_{cbo}	@ $100 \mu A$	26	28	30	volts
hV_{cbo}	@ $10 \mu A$	5.0	5.1	5.3	volts
hV_{cbo}	@ $100 \mu A$	5.1	5.1	7.0	volts
hFE	@ 0.5 V, 10 mA	51	63	83	

Thus, it appears from probe readings that all units are good electrically. Although the corrosion on the metallization does not appear to affect the devices' electrical characteristics, it could cause problems in making contacts to other components. This corrosion problem can probably be overcome, however, if, after wire leads are bonded to the contact areas, a protective coating such as glass or epoxy is applied to the units.

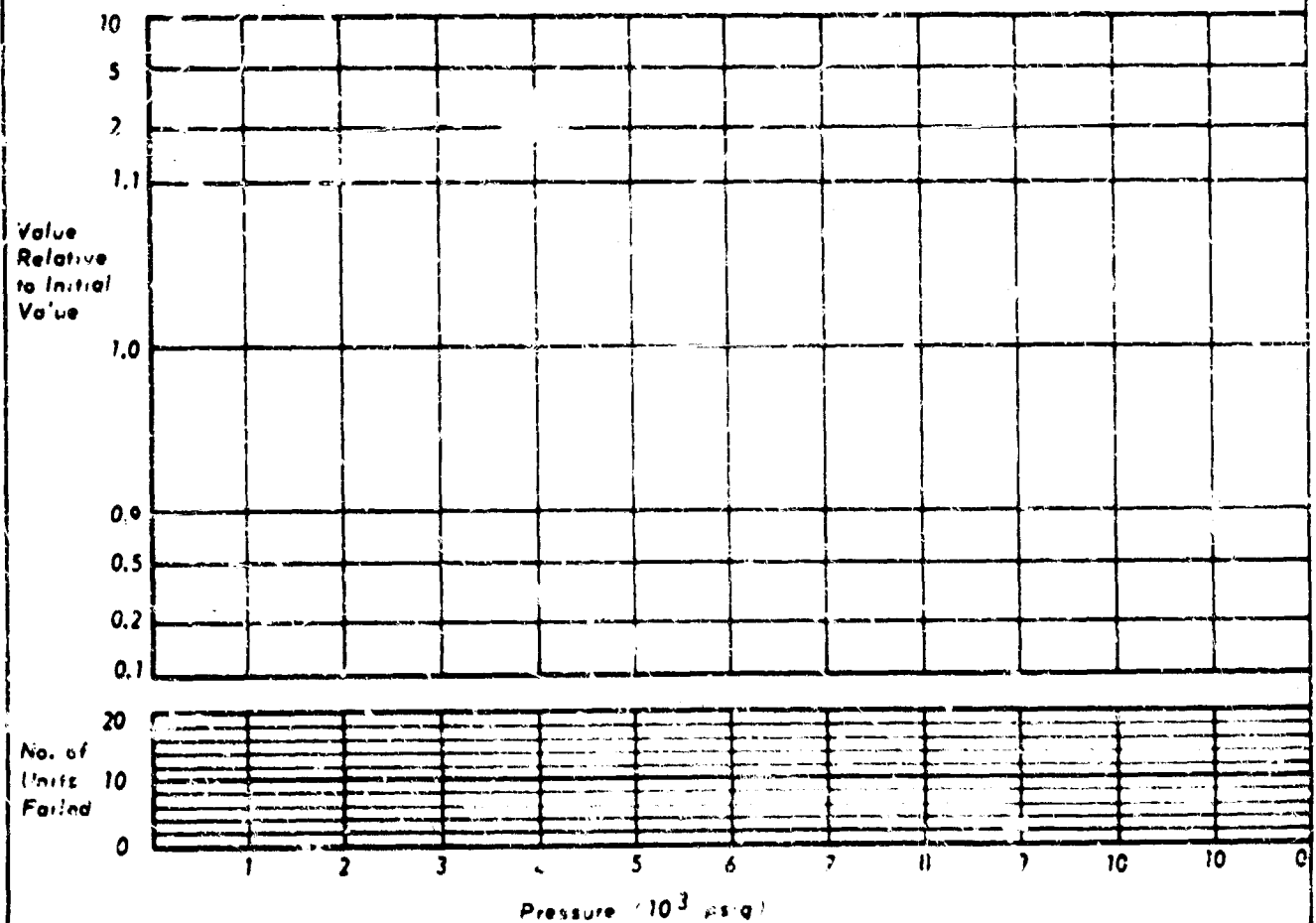
MFG. TEXAS INSTRUMENTS
TYPE TRANSISTOR
DESCRIPTION 2N743

CHART NO. 152
NO. OF SAMPLES TESTED



MFG.
TYPE
DESCRIPTION

CHART NO.
NO. OF SAMPLES TESTED



Texas Instruments
ZTI 743
Transistor

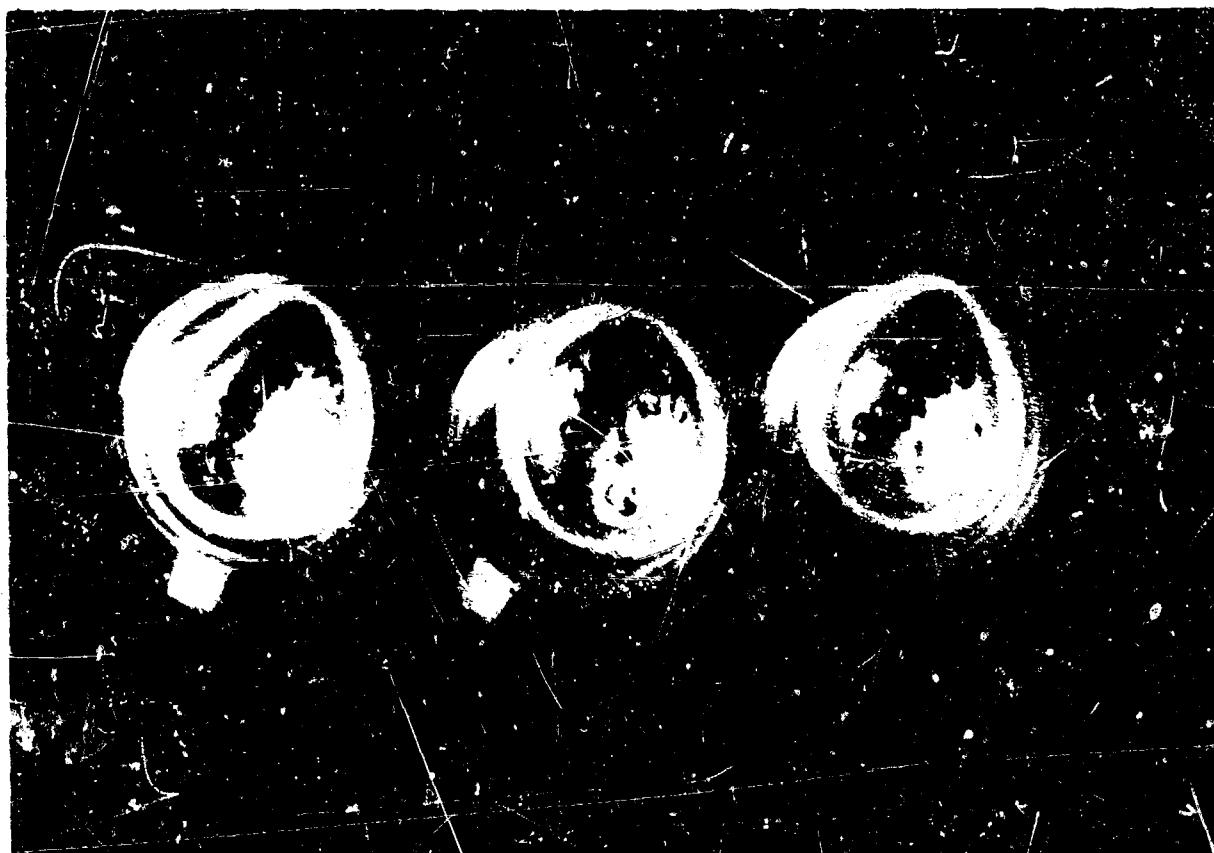
$I_{cbo} = 1 \mu A$
 $BV_{cbo} = 20 V$

NPN epitaxial
Diffused mesa silicon

SOAK PERIOD: None

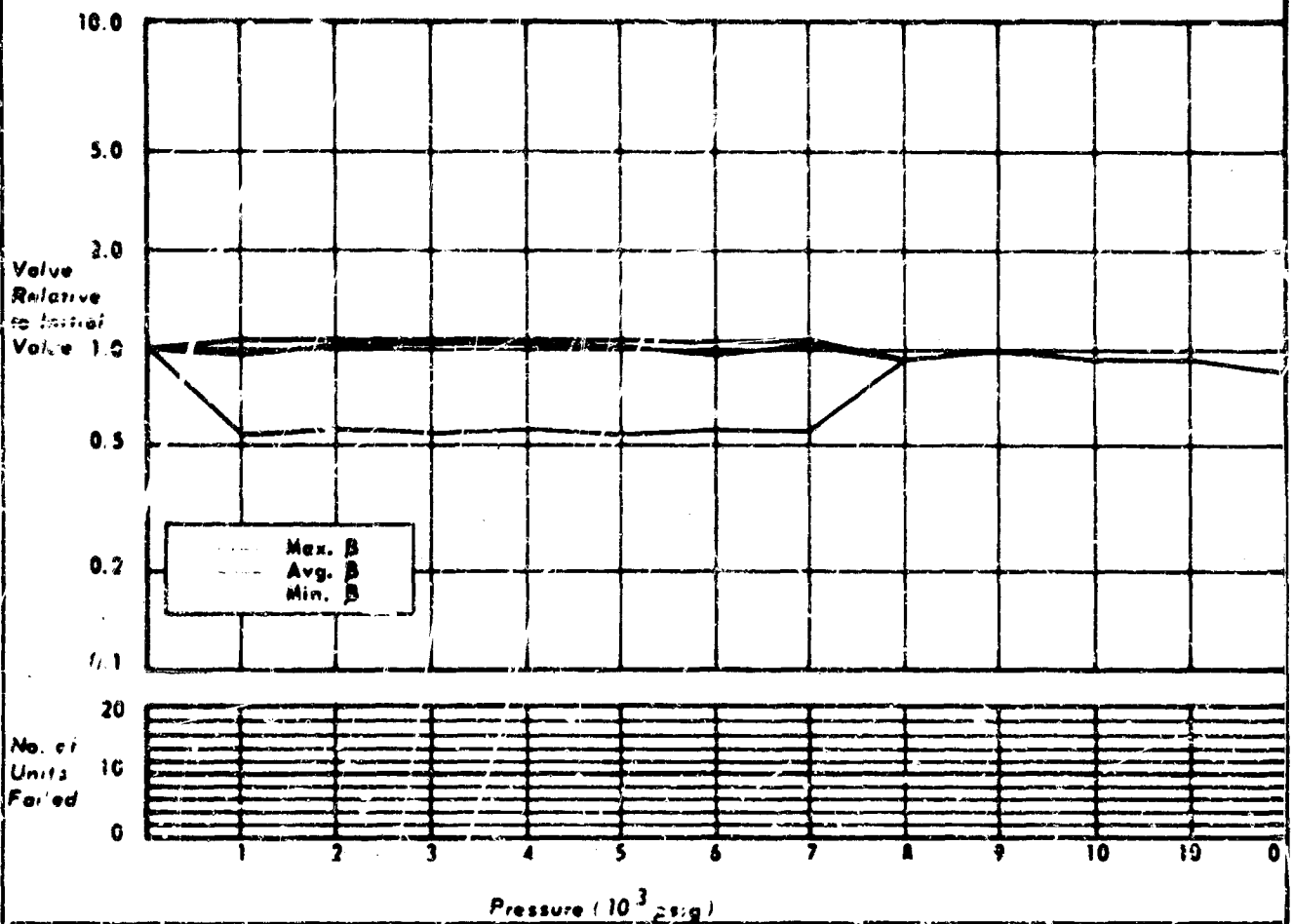
MECHANICAL: All metal cases were deformed.

ELECTRICAL: After completion of test it was noted that instrumentation problems had given invalid readings on all except one transistor. That component operated through 3,000 psig, failing between 3,000 and 4,000 psig.



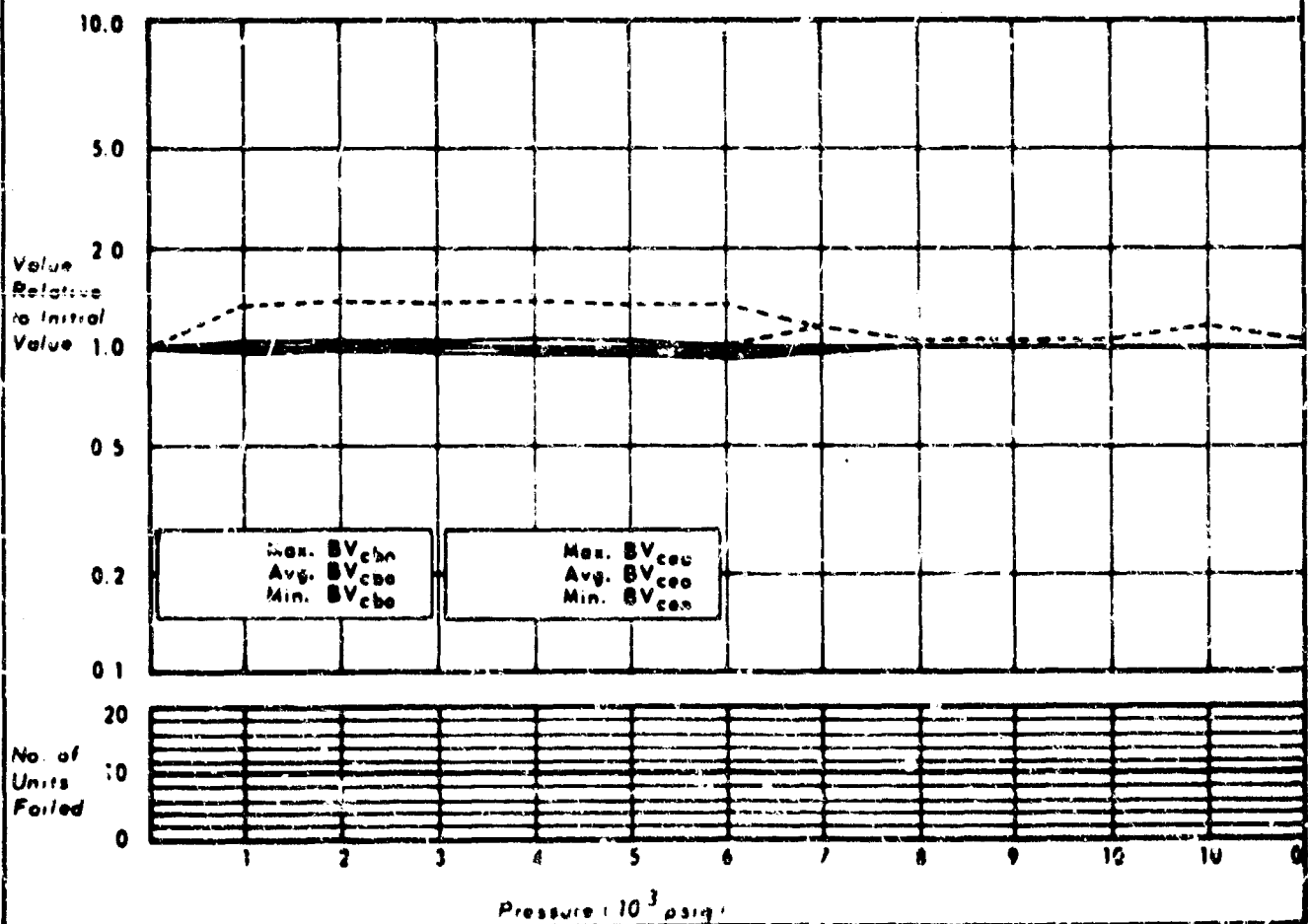
MFG. - TEXAS INSTRUMENT
 TYPE - TRANSISTOR
 DESCRIPTION - 2N2051

CHART NO. 133
 NO. OF SAMPLES TESTED - 3



MFG.
 TYPE
 DESCRIPTION (SAME AS ABOVE)

CHART NO. 133A
 NO. OF SAMPLES TESTED



Texas Instruments

BY 2861

Transistor

SOAK PERIOD: None

MECHANICAL: The end caps of all components were deformed.

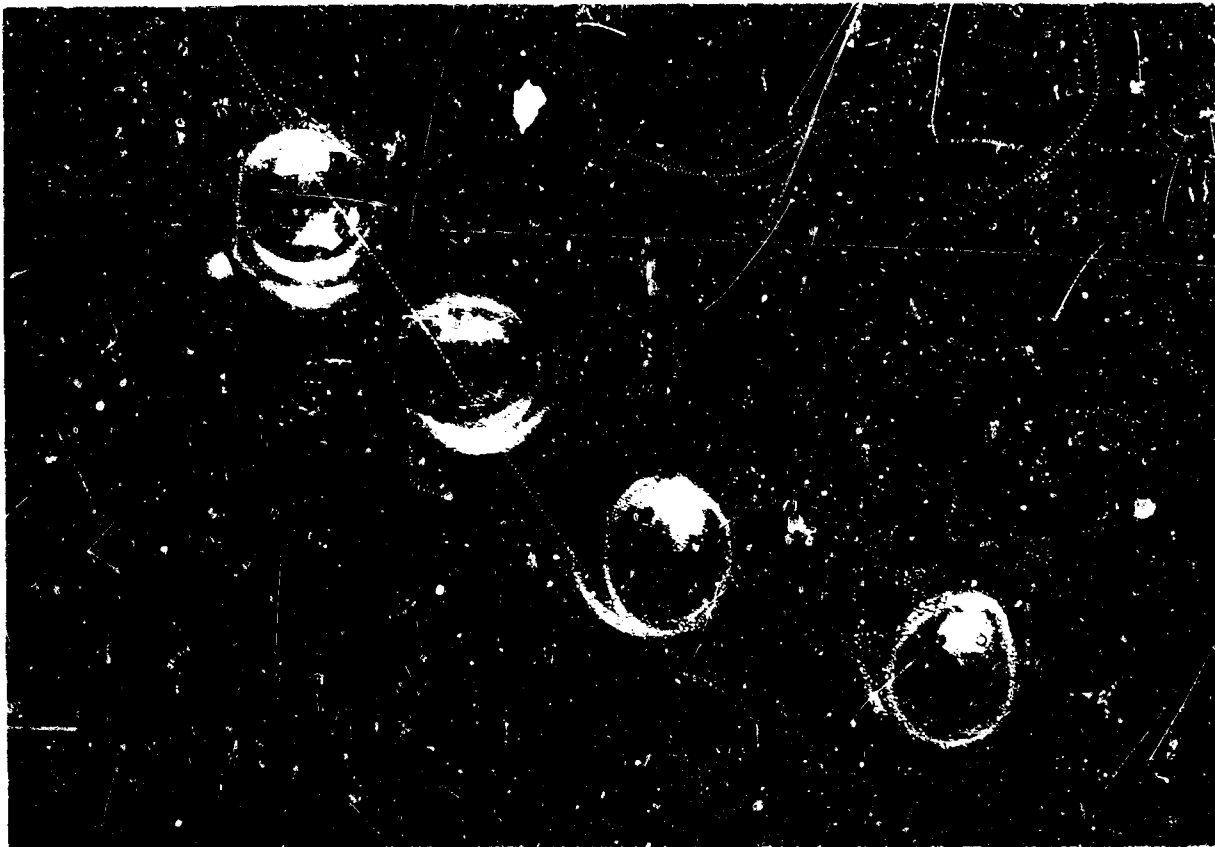
ELECTRICAL: All components functioned normally through 6000 psig. One component continued operational through the entire test program

I_{cbo} 10 mA

SV_{cbo} 25 V

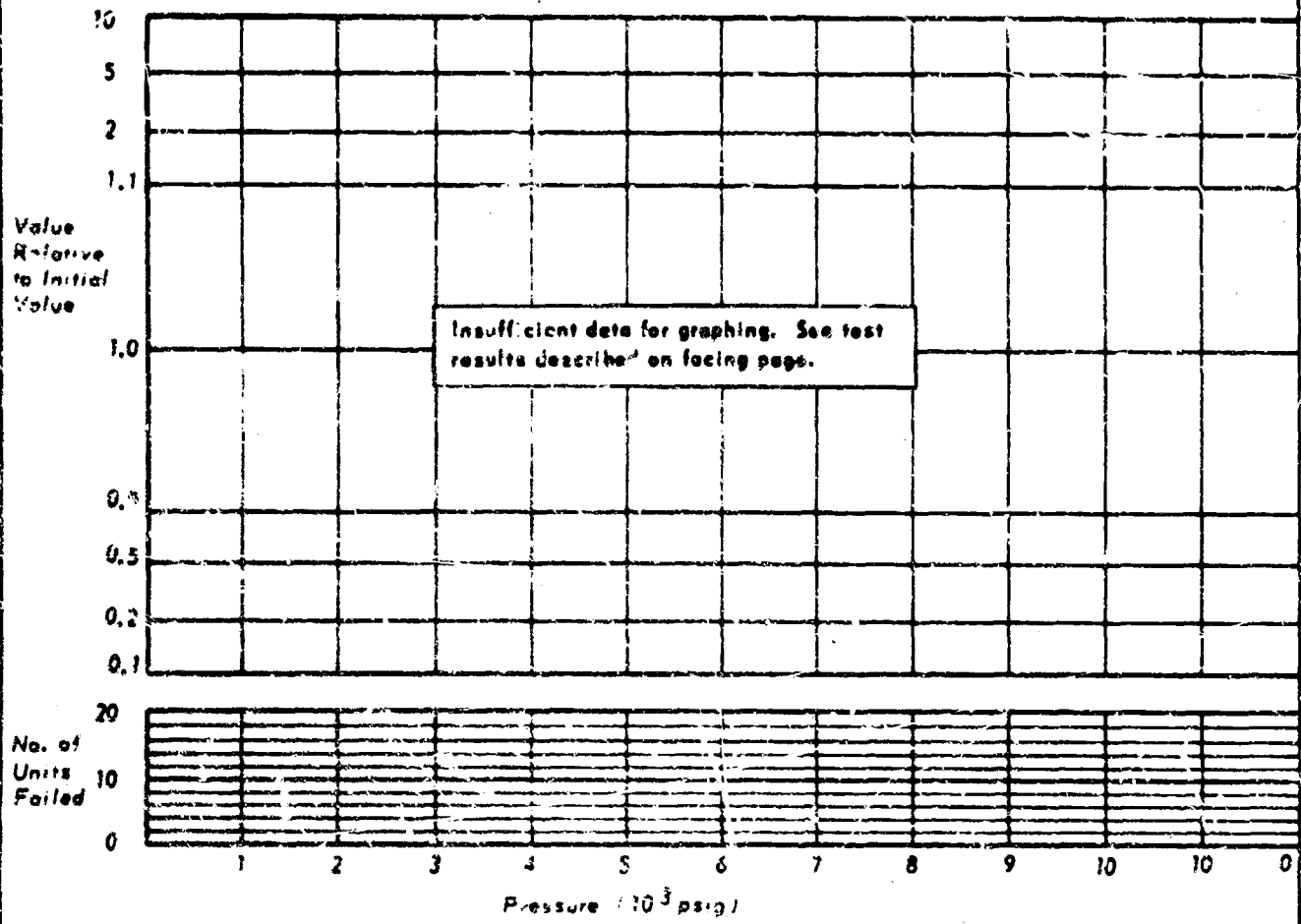
PNP epitaxial

Pioneer silicon



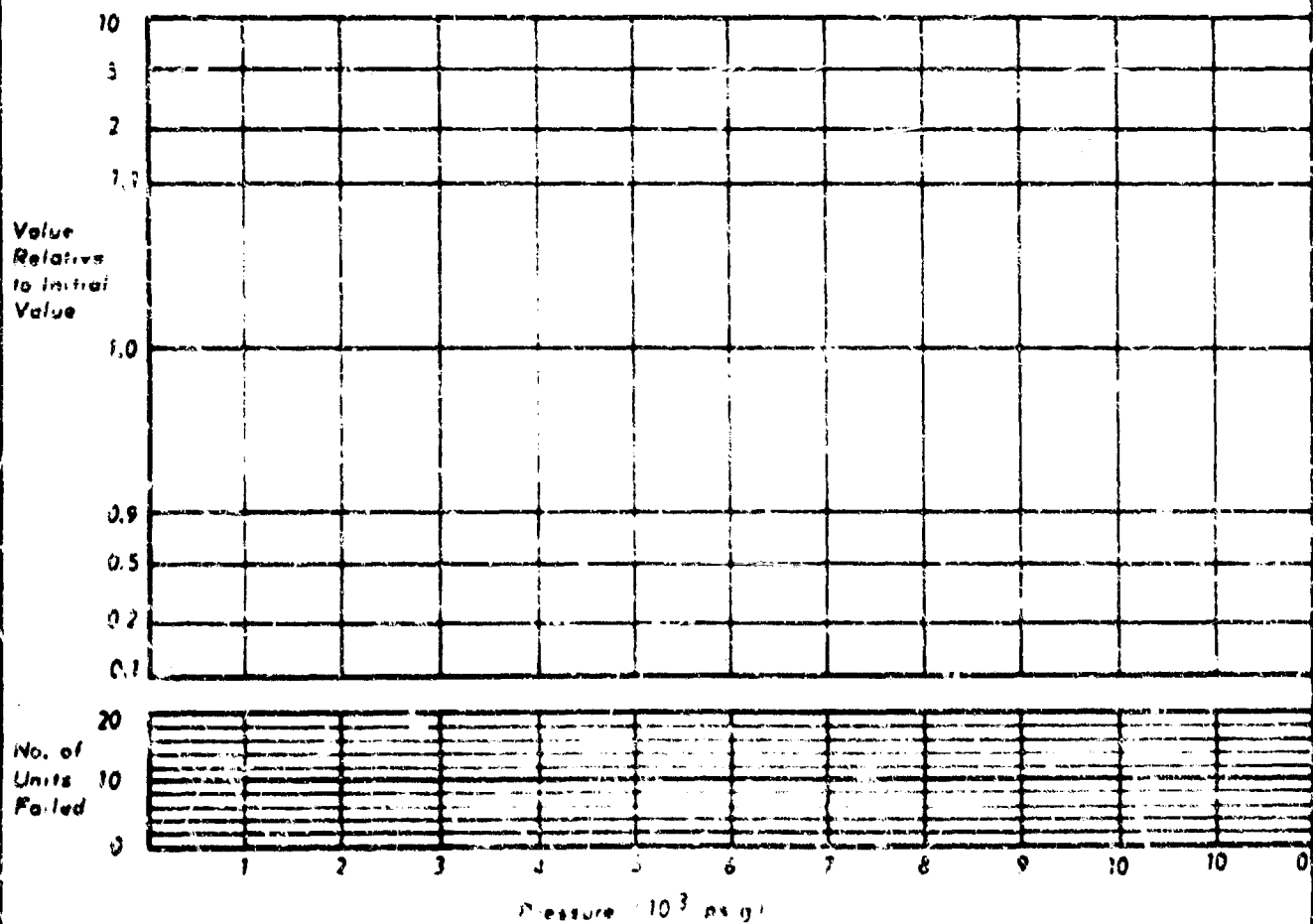
MFG. - MOTOROLA
TYPE - TRANSISTOR
DESCRIPTION - 2N2904

CHART NO. 154
NO. OF SAMPLES TESTED



MFG.
TYPE
DESCRIPTION

CHART NO.
NO. OF SAMPLES TESTED



Motorsola

2N 2904

Transistor

Integrated network

Four PNP Transistors

Silicon, passivated

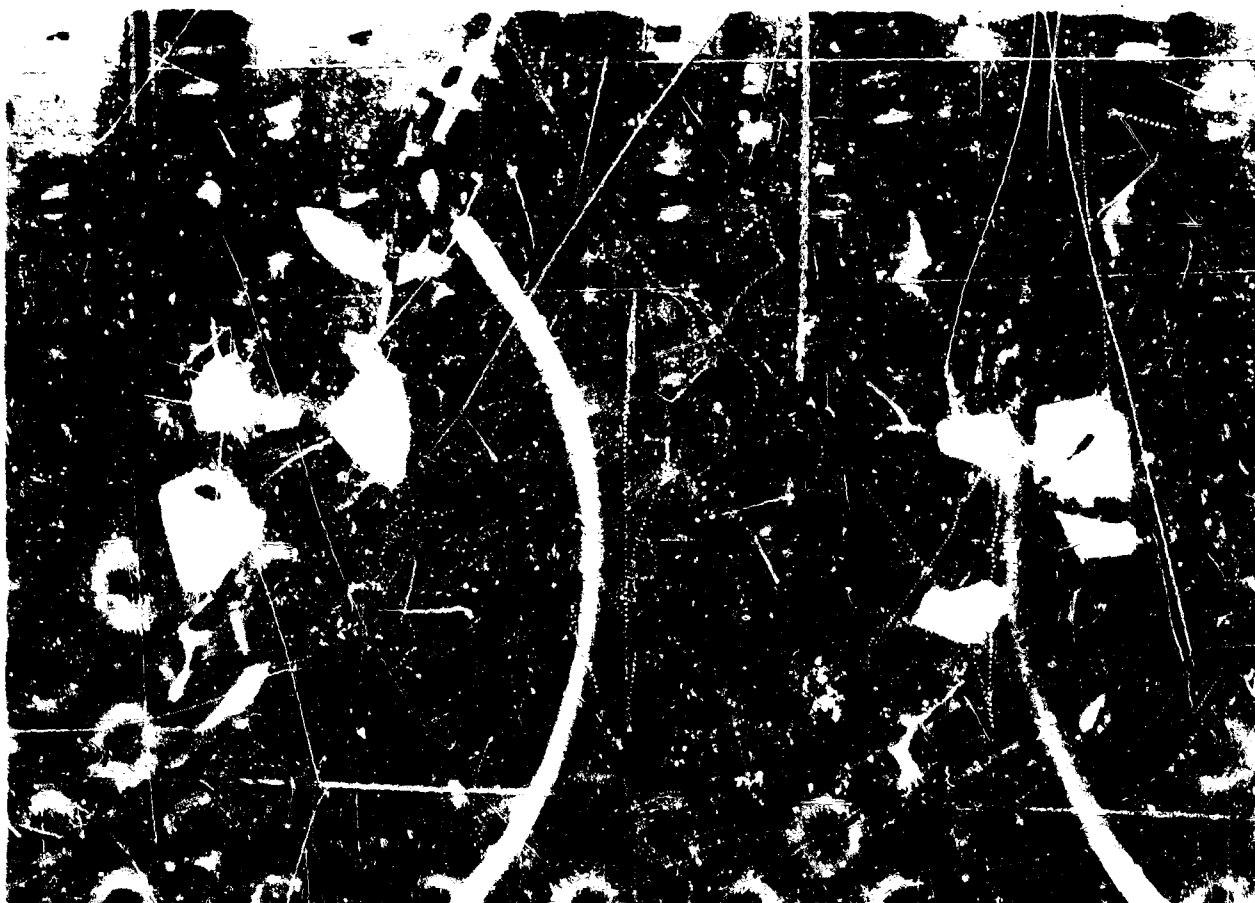
Ceramic flat package

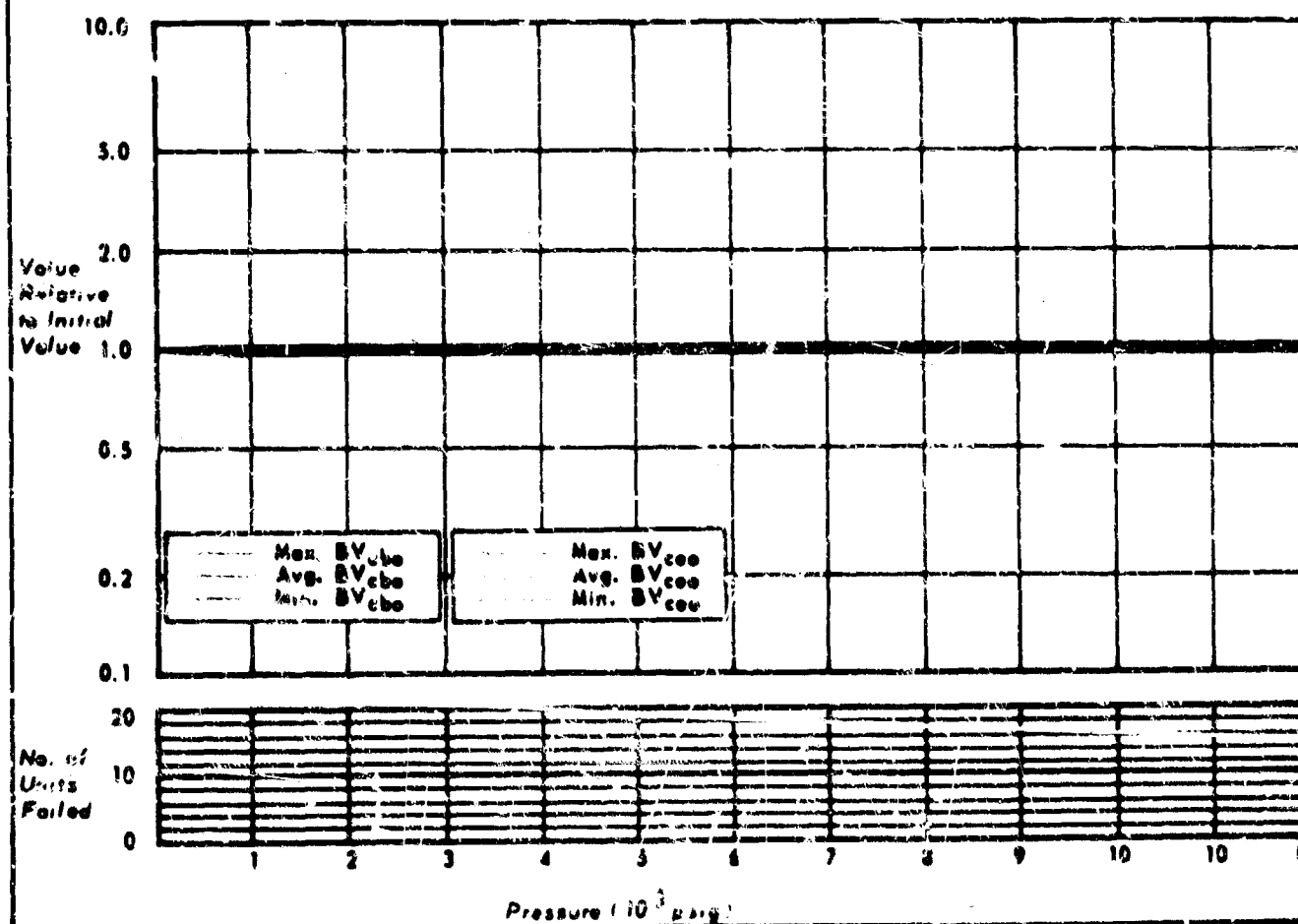
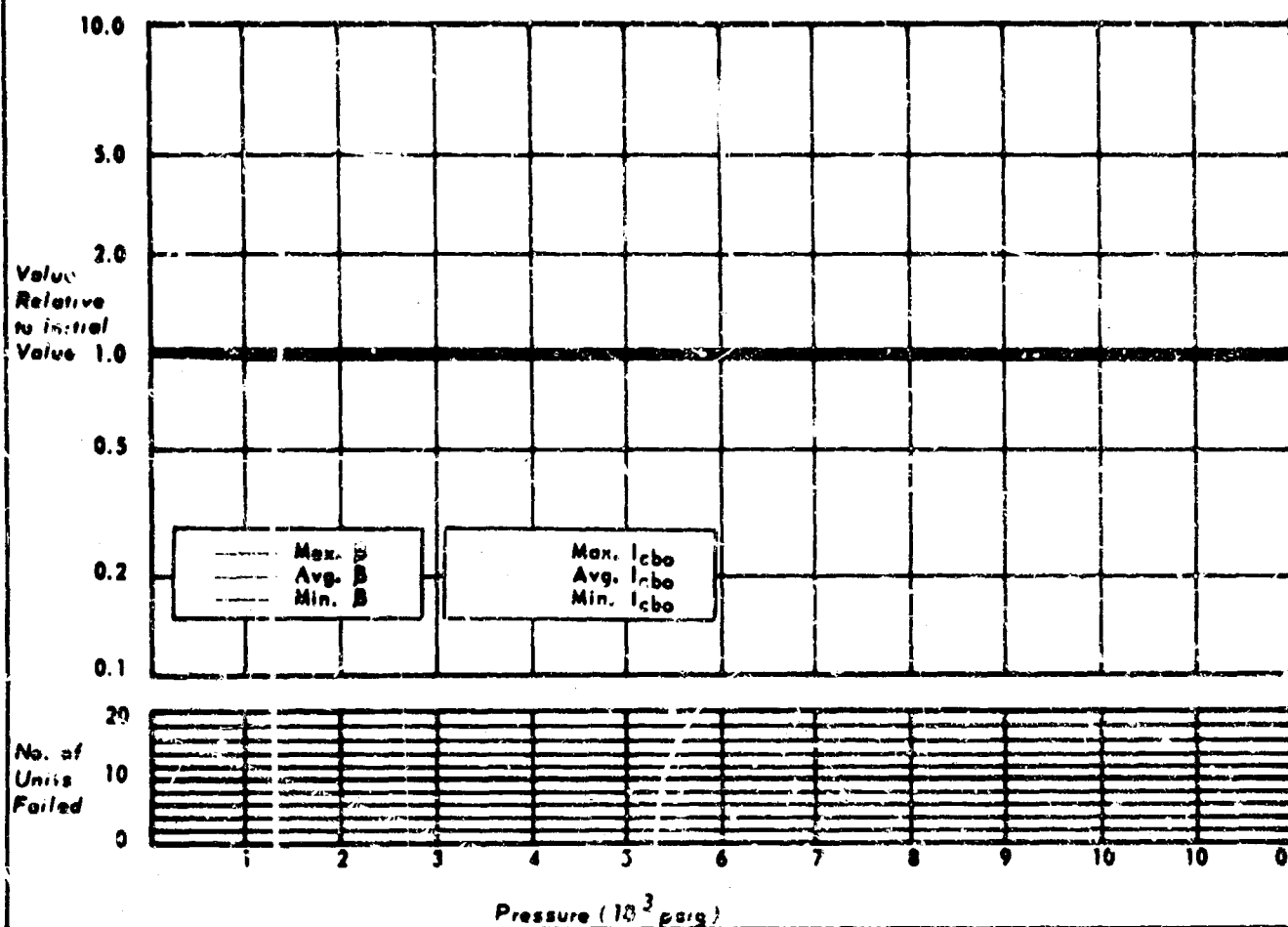
6 lead

0.25 x 0.125"

SOAK PERIOD: None

All packages were crushed before reading the 1,000 psig reading station. No electrical readings were possible other than at the initial 0 psig pressure.





Motorola

MD982F

Transistor

Integrated network

SOAK PERIOD: None

MECHANICAL: Sixteen packages were crushed between 1000 & 2000 psig. Four packages remained intact through the entire test program.

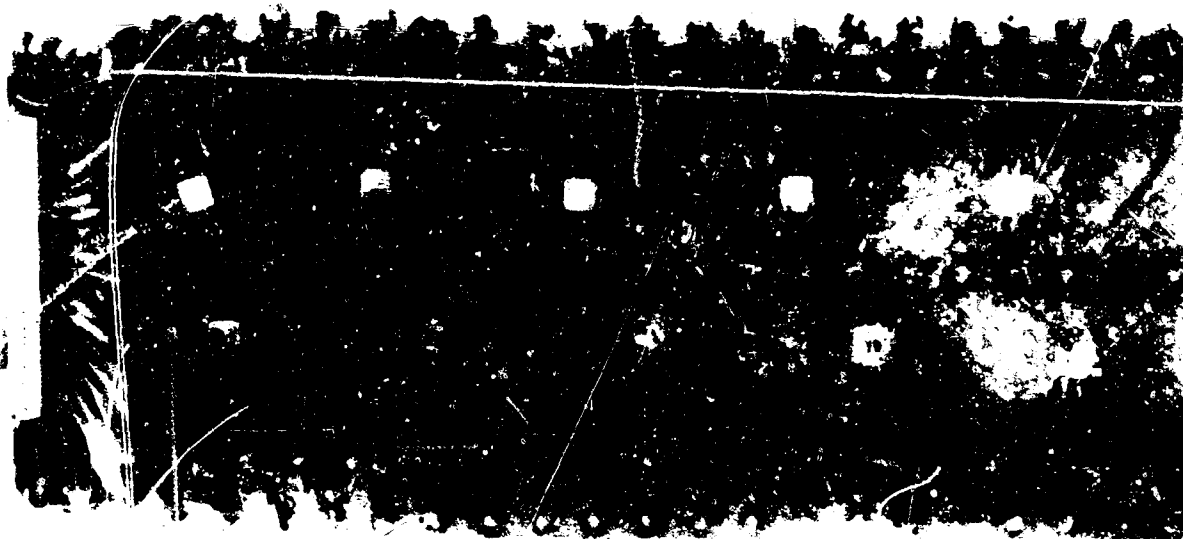
ELECTRICAL: Sixteen components functioned through 1000 psig. Four components functioned normally through the entire test program.

Two PNP transistor

Silicon, epitaxial

Ceramic flat package

14 lead



14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Component testing						

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DOCUMENT CONTROL DATA - R&D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
University of California, Marine Physical Laboratory		UNCLASSIFIED	
		2b. GROUP	
3. REPORT TITLE			
ELECTRONIC COMPONENTS AT 10,000 PSI			
3. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
Summary of component testing. 12 June 1964 to 1 May 1965.			
4. AUTHOR(S) (Last name, first name, initial)			
Anderson, Victor C. Gibson, Daniel K. Ramey, Roy E.			
6. REPORT DATE		7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
1 May 1965		191	18
8a. CONTRACT OR GRANT NO.		8a. ORIGINATOR'S REPORT NUMBER(S)	
Nont 2216 (05)		~~DD FORM 1473-64~~	
8. PROJECT NO.		8b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
		MPL-U-64/64	
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11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		Office of Naval Research, Code 466 Department of the Navy Washington, D. C. 20360	
13. ABSTRACT			
This report presents the results of a component test program in which a series of commercial electronic components were immersed in oil and subjected to hydrostatic pressures ranging from 0 to 10,000 psig. Over 3000 components representing 163 manufacturer types were tested. Results are presented in graphic form for the readers' own interpretation. (U)			

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0101-207-6802

UNCLASSIFIED

Security Classification

Marine Physical Laboratory MPL-U-64/64 ELECTRONIC COMPONENTS AT 10,000 PSI by Victor C. Anderson, Daniel K. Gibson and Roy E. Ramey, University of California, San Diego, Marine Physical Laboratory of the Scripps Institution of Oceanography, San Diego, California 92132. This report presents the results of a component test program in which a series of commercial electronic components were immersed in oil and subjected to hydrostatic pressures ranging from 0 to 10,000 psig. Over 3000 components representing 163 manufacturer types were tested. Results are presented in graphic form for the readers' own interpretation.	V. Ocean engineering 1. Victor C. Anderson 2. Daniel K. Gibson 3. Roy E. Ramey Sponsored by Office of Naval Research UNCLASSIFIED
Marine Physical Laboratory MPL-U-64/64 ELECTRONIC COMPONENTS AT 10,000 PSI by Victor C. Anderson, Daniel K. Gibson and Roy E. Ramey, University of California, San Diego, Marine Physical Laboratory of the Scripps Institution of Oceanography, San Diego, California 92132. This report presents the results of a component test program in which a series of commercial electronic components were immersed in oil and subjected to hydrostatic pressures ranging from 0 to 10,000 psig. Over 3000 components representing 163 manufacturer types were tested. Results are presented in graphic form for the readers' own interpretation.	V. Ocean engineering 1. Victor C. Anderson 2. Daniel K. Gibson 3. Roy E. Ramey Sponsored by Office of Naval Research UNCLASSIFIED
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